...el discusses welded rail
p. 21

...way TRACK and STRUCTURES

December 1960

New high-level bridge cuts traffic delays
p. 28

A Simmons-Boardman TIME-SAVER Publication

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Nalco® MOLY STICK

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dry lubricant extends locomotive and car wheel life 30% to 300%! . . .

NALCO "Moly Lubricator Stick" is a highly effective dry lubricant that maintains a tough lubricating surface between locomotive wheel flanges and track under extremes of pressure and temperature . . . without picking up dirt and sand to form a harmful grinding compound.

"MOLY LUBRICATOR STICKS" provide automatic flange lubrication that extends wheel life from a substantial 30% to as much — particularly on yard locomotives — as a whopping 300%.

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How to keep a crossing in its place

See those trim little plates paired off on the ties, with their built-in "hooks" hugging tight to the rail? Those are Bethlehem Hook-Twin Tie Plates. And they are keeping this crossing in its place.

Here's How Hook-Twin Tie Plates Improve Track Anchorage

They excel in holding down crossings, frogs, closure rails, tee guard rails, graduated riser switches, and tongue switches and mates. For one thing, those sturdy forged hooks are larger and stronger than regular spike heads. For another, they distribute the load over a greater tie area, reducing the pull on any one spike. This anchors the track, checks vertical and lateral thrust, and gives ties a considerably longer lease on life.

They Reduce Your Inventory

Your stores department will like the way Hook-Twin Tie Plates hold down inventories. Normally, three or four lengths of these plates are all you'll ever need to carry in stock, since any two plates will fit most any position on any frog or crossing on your lines. No special plates are needed.

Available In Standard Sizes

Hook-Twin Tie Plates can be furnished from stock in 23-, 27-, 31-, and 35-in. lengths, 4-in. width, and in thicknesses of $\frac{3}{4}$, $\frac{7}{8}$, and 1 in. Hooks may be specified "low" for contacting rail bases, "high" for cast manganese sections. Reverse-hook plates, used at heel-ends, are available in all lengths. For further details just call the nearest Bethlehem sales office. Or write direct to us and ask for Folder 642.

BETHLEHEM STEEL COMPANY, Bethlehem, Pa.
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BETHLEHEM STEEL

BETHLEHEM STEEL

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7 SOUND REASONS WHY YOU CAN CONFIDENTLY SPECIFY THE JACKSON MONORAIL TAMPER

1 IT'S AN EXTREMELY VERSATILE MACHINE . . . the product of the world's most successful manufacturer of tamping equipment. Ideal for spotting and smoothing, excellent for those secondary programs which do not justify the investment or use of our dual-rail tamping machines.

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3 HYDRAULICALLY CONTROLLED. Traveling, movement from tie to tie and operation of the workhead are all hydraulically actuated and controlled.

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5 FURNISHED WITH SET-OFF AND TRAILER EQUIPPED FOR TOWING BEHIND TRUCK TO DESIRED LOCATIONS.

6 PARTICULARLY ADAPTABLE TO SMALLEST GANGS.

7 THE JACKSON SERVICE ORGANIZATION INSURES proper installation, operation, care and most efficient use of the machine by working closely and wholeheartedly with all personnel concerned.

THE JACKSON TRACK MAINTAINER

Unmistakable leader in its field again in 1961. Offers greatest speed compatible with first quality tamping. Perfectly adaptable to all conditions . . . kinds and condition of ballasts and lowest to highest lifts. Achieves the longest-lasting, good-riding track qualities . . . bona-fide facts you can easily verify. Specify it for 1961.

Write, wire or phone for the complete facts. You'll be able to specify it with complete confidence. We offer attractive acquirement plans.

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LUDINGTON, MICHIGAN

Railway TRACK and STRUCTURES

DECEMBER

1960 • Vol. 56, No. 12

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Member, Audit Bureau of Circulations (ABC). Indexed by Engineering Index, Inc.

Report on welded rail today 21

Panel of experts discusses this timely subject before a recent meeting of the Maintenance of Way Club of Chicago.

Erie formula for fast surfacing 24

L. H. Jentoft describes the practices and equipment that make it possible for system gang to attain an average output of two miles per day.

New bridge cuts traffic delays 28

Burlington bridge across Mississippi, with clearance of 63 ft under main span, takes place of low-level structure with swing span.

How good are ties in track today? 31

This and other questions relating to crossties were answered in addresses presented during the annual meeting of Railway Tie Association.

Wire 'sighting' device now lines through turnouts 32

Describes newly developed hydraulic devices that enable the Trakliner-Line Indicator combination to line track in limits of turnouts.

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◀ Don't miss . . .

The complete story of M/W progress on the Pennsylvania—departmental organization, track standards, cost control and programming, mechanization of track and B&B work, etc. What they do and why they do it.

. . . in the January issue

Fairmont TIE BED SCARIFIER

Digs a uniform tie bed ten feet long in one minute!

It would take as many as fifteen men, working at top speed with ordinary hand tools, to dig a ten-foot tie bed as fast as the Fairmont W87 Series B Tie Bed Scarifier. Even then, manual crews couldn't equal the uniform, predetermined depths, or dig beds consistently square to the track, working at the rate of up to 800 tie beds per day!

The W87 can be used in any type ballast, and whether the ties are being dug in, or replaced when track is raised. Excavated ballast is deposited nearby for easy tamping and dressing. A high gear allows the W87 to deadhead at 25 mph, and a hydraulic turntable and set-off permit clearing at the work site.

The time and labor savings possible will pay for each W87 during the first season of tie renewal operations—*and* earn a handsome profit on the machine investment! So why not mechanize your tie gangs with a Fairmont W87 Series B Tie Bed Scarifier? Call or write for full information.

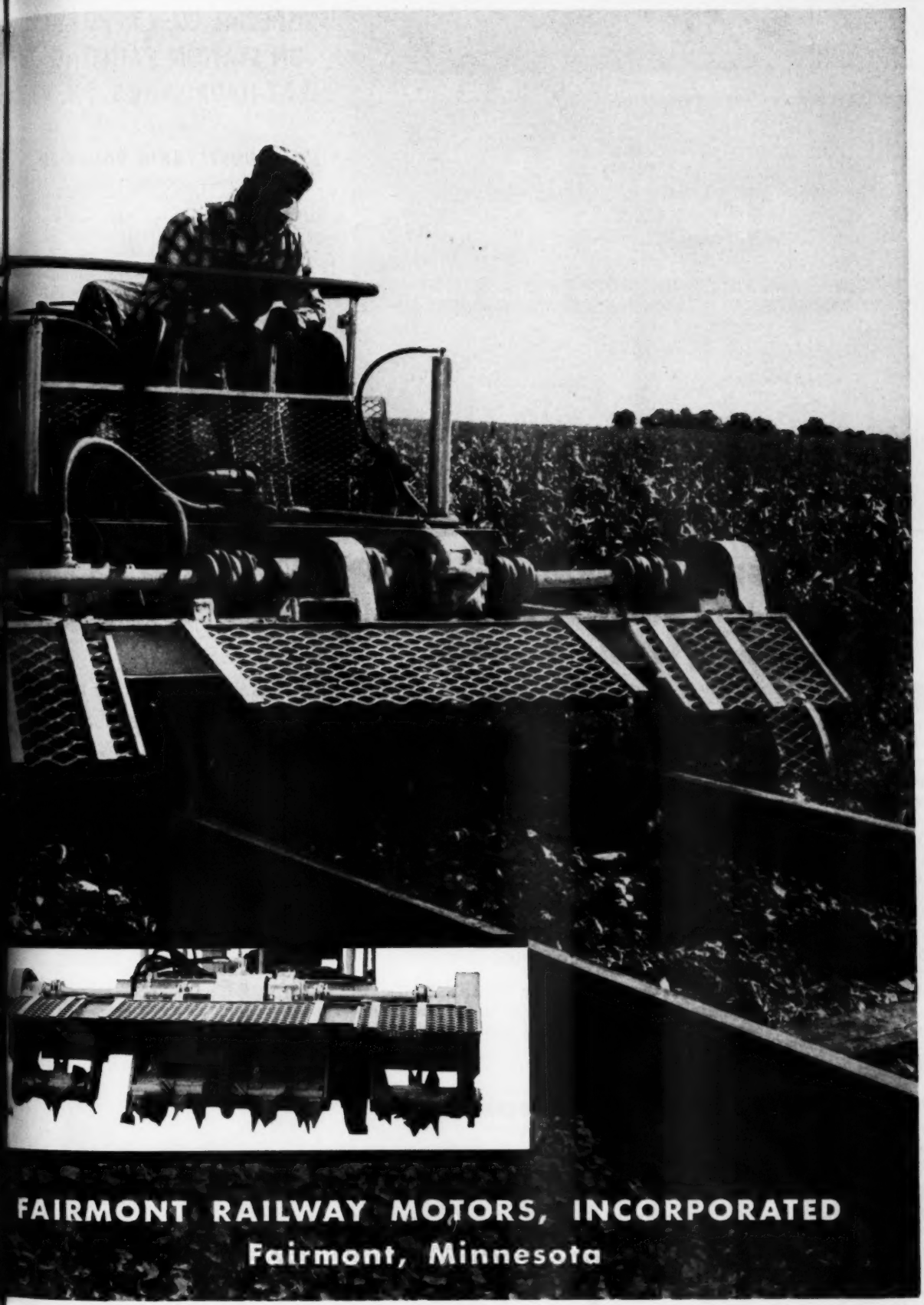
Fairmont equipment is available on lease.

W68 SERIES A HYDRAULIC TIE REMOVER. Requires only two men to push out old ties at the rate of one per minute. Constructed for quick set-offs.

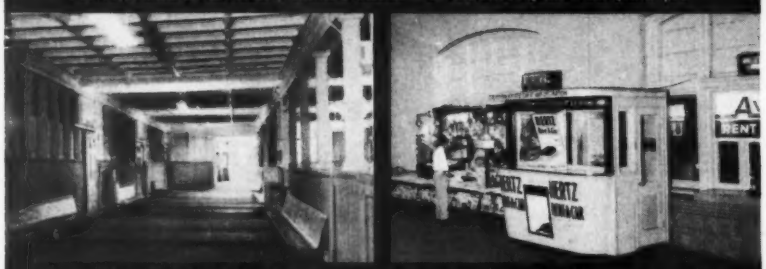
W84 SERIES B HYDRAULIC SPIKE PULLER. Operated by one man. Works both sides of both rails. Pulls 15 to 20 spikes a minute.

W90 SERIES A TIE HANDLER. Two-man operation. Inserts new ties or removes old ties in a few seconds. Self propelled.

The Fairmont W87 is equip with renewable steel dig teeth, angle-mounted in p for faster digging action


FAIRMONT RAILWAY MOTORS, INCORPORATED
Fairmont, Minnesota

Pennsylvania's Harrisburg Station. Inside—a 103,070 square-foot paint job.



Square-foot cost for Hydra-Spraying this interior came to only 4½ cents per foot.

How GRACO Hydra-Spray cut building painting costs for the Pennsylvania Railroad

When someone cuts painting costs to less than a fourth of what they were seven years ago, you've got to admit that this is a tremendously significant saving. Indeed, it's almost unbelievable!

Yet, that's exactly what the Pennsylvania Railroad did when it recently repainted its Harrisburg, Pa., station (illustrated above) using new *airless* GRACO Hydra-Spray equipment.

The cost? $4,638.15. The 1953 cost for the same building and the same square footage? $20,000. Check the company's own report . . . it's reproduced directly to the right.

Moreover, the *airless* method of Hydra-Spraying your paints and other protective coatings provides other big benefits as well:

- **It virtually eliminates overspray.**
- **Allows heavy film build-up.**
- **Eliminates pin-holing.**
- **Gives high penetration on rough surfaces and full coverage in recessed areas . . . without excessive solvent reduction.**

Ask your GRACO Railway Representative to tell you more. Write or call him today.

SPECIAL COST REPORT ON STATION PAINTING AT HARRISBURG, PA.

THE PENNSYLVANIA RAILROAD

Philadelphia / March 7, 1960

SUBJECT: Spray painting of interior of passenger station at Harrisburg, Pa. Total coverage, 103,070 sq. ft.

Recently the above subject station was spray painted (with new Graco equipment) by our own forces—one foreman and four painters—during their regular tour of duty 7:00 A.M. to 3:30 P.M. for $4,638.15.

In the year of 1953 this same station was brush painted for $20,000. We are unable to say what the size of the force was at that time, but we do know that it was painted during off hours, therefore causing overtime.

BREAKDOWN OF COST

(Labor and Materials to paint 103,070 sq. ft.)

Forces

One foreman and four painters

January

160 manhours @ $3.08 per hr.	$ 492.80

February

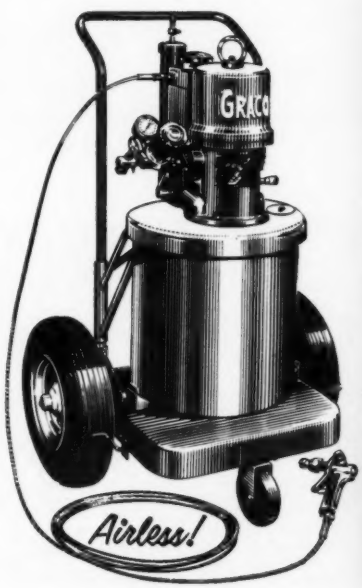
664 manhours @ $3.15 per hr.	2,091.60
	$2,584.40

MATERIALS

White	$ 990.00
Seafoam green	472.50
Aspen green	225.00
Bench green enamel	46.00
Varnish	31.25
Diesel fuel oil	49.00
240 meals	240.00
TOTAL	$4,638.15

Coverage per gal. of paint....approx. 270 sq. ft.

Cost per sq. ft.....$.045



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3030 South 25th Ave.

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M. H. Frank Company, Inc.
1202 Marshall Building

HOUSTON
Houston Railroad Supply Co.
1610 Dumble Street

PHILADELPHIA
The A. R. Kidd Co.
1036 Suburban Station Bldg.

LOUISVILLE
T. F. & H. H. Going
6308 Limewood Circle

ST. LOUIS
The Carriers Supply Company
818 Olive Street

NEW YORK—Newark, New Jersey
R. A. Corley
744 Broad Street

SAN FRANCISCO
The Barnes Supply Company
Rm 504, 74 Montgomery Street

TWIN CITIES—St. Paul, Minn.
The Daniel L. O'Brien Supply Company
Endicott-On-Fourth Bldg.

WASHINGTON—Arlington, Va.
Southeastern Railway Supply, Inc.
2304 Wilson Blvd.

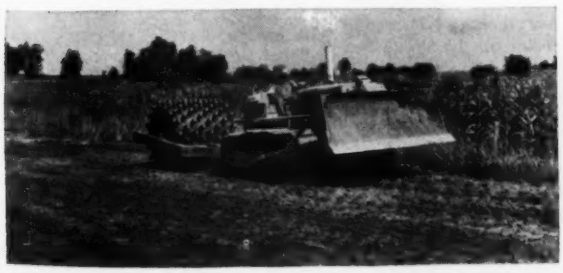
MONTREAL—Ontario, Canada
International Equipment Co., Ltd.
360 St. James Street West

SCRAPER-LOADING using a Caterpillar No. 60 Scraper is a job the new D7 handles with ease. New Turbocharged Cat Diesel delivers 140 HP. Greater torque rise increases its lugging ability 80 per cent.

TRIPLE PLAY BY NEW D7

Three different tasks and 20 per cent more production

DOZING approaches to Eleven Point Bridge, the D7 aerates heavy, wet earth before compacting and adding more fill. New dry-type air cleaner, lifetime lubricated rollers and new transmission lubricating system make low-cost operation normal for a Cat-built Tractor.



COMPACTING is a job the D7 Series D takes in stride. Final drive gears have been strengthened on the new model and big job-proved features have been retained... such as the exclusive oil clutch which delivers as many as 2000 service hours without adjustment.

All-around performance—dozing, scraping, compacting—makes the D7 Series D an even better investment than the efficient machine it replaced. On this bridge construction job over the Eleven Point River at Dalton, Ark., the approaches had to be cleared and the road widened. Through heavy, wet sand and clay, the new D7 more than lived up to the expectations of Superintendent Farris Whited, Jr., of the E. E. Barber Construction Company, Fort Smith, Ark.: "The new D7 Series D is the best tractor I have ever operated. It can do at least 20 per cent more work than the former model. It loads the scraper fast and hauls and pulls good. In dozing it can really move the dirt, too!"

Ask your Caterpillar Dealer—who sells, services and maintains a complete parts inventory for a full line of equipment—to demonstrate a new D7. You supply the job and name the date. He'll supply the machine and proof of performance. Call him today.

Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

WANTED—THE HARD WORK

NEWS ABOUT PEOPLE

CANADIAN PACIFIC—G. W. Miller, assistant general manager (special duties) of the Eastern Region at Toronto, Ont., and formerly engineer maintenance of way there, has been promoted to assistant general manager of the region, with the same headquarters, succeeding **W. F. Koehn** who has retired after 44 years of service. Mr. Koehn is also an engineer by training and experience.

CHESAPEAKE & OHIO—I. D. Brown, inspector water supply at Huntington, W. Va., has been promoted to inspector water supply—system, with the same headquarters.

DELAWARE & HUDSON—The following changes have occurred recently: **J. C. Brennan,** assistant superintendent at Albany, N. Y., to assistant chief engineer there; **H. B. Clarkson,** assistant to chief engineer at Albany, to assistant engineer maintenance of way there; **N. H. Williams,** engineer track at Albany, to track supervisor—system, with headquarters at Albany; **H. E. Schultz,** bridge and building supervisor at Colonie, N. Y., to bridge and building supervisor—system, with headquarters at Colonie; **A. W. Cruikshank,** plumbing and heating supervisor at Colonie, to bridge and building supervisor there; and **W. E. Bailey,** special engineer at Albany, to office engineer there. **Maurice A. Clancy,** supervisor steel construction, has retired after 49 years of service.

The following positions have been abolished: Assistant to chief engineer, special engineer, engineer track, supervisor steel construction, and plumbing and heating supervisor.

ELGIN, JOLIET & EASTERN—Tony Schramm has been appointed general bridge and building foreman, with headquarters at Joliet, Ill., succeeding **Joseph Planeta** who retired recently.

ERIE-LACKAWANNA—J. S. Parsons, chief engineer of the Erie, at Cleveland, has been appointed chief engineer of the Erie-Lackawanna, which was formed by merger of the Erie and the Delaware, Lackawanna & Western, effective October 15. Other top engineering officers of the Erie have been appointed to the same positions for the merged system. These include **L. H. Jantoft,** assistant chief engineer maintenance of way; **A. K. Frost,** assistant to chief engineer maintenance of way; **S. B. Gill,** assistant chief engineer—engineering; **C. A. Roberts,** engineer of structures; **W. F. Petteys,** engineer maintenance of way, Eastern District, Hoboken, N. J., and **L. M. Swoap,** engineer maintenance of way, Western District, Youngstown, Ohio.

R. F. Bush, chief engineer of the Lackawanna, has been appointed assistant chief engineer—staff of the E-L, at Cleveland. These other Lackawanna officers have been appointed to positions on the merged system: **B. L. Beier,** engineer maintenance of structures, to special engineer, Cleveland; **C. M. Segraves,** engineer structures, to staff engineer; **J. A. Pollard,** assistant to engineer maintenance of way, to assistant engineer maintenance of way, Eastern District, Hoboken; **W. A. Swartz,** engineer track, to assistant engineer maintenance of way, Western District, Youngstown; **Bernard Geier,** engineer of equipment and design, to the same position; and **E. J. Elston,** general roadmaster, to the same position on the Western District at Youngstown.

FRISCO—J. O. Elliott, assistant division engineer at Springfield, Mo., has been promoted to division engineer at Fort Smith, Ark., succeeding **R. D. White** who has been transferred to Amory, Miss. Mr. White succeeds **G. E. Warfel** who has been transferred to Springfield, succeeding **H. M. Booth** who has retired after more than 42 years of service.

F. L. Richardson, Jr., assistant general foreman bridges and buildings and water service at Tulsa, Okla., has been promoted to general foreman B&B&WS at Enid, Okla., succeeding **E. F. Paschal** who has been transferred to Fort Worth, Tex. Mr. Paschal succeeds **J. A. Latimer** who has been transferred to Springfield, succeeding **J. W. McDonald** who has retired after more than fifty years of service.

T. J. Pigg, assistant roadmaster at Tulsa, has been promoted to roadmaster at Fayetteville, Ark., succeeding **G. P. Chandler** who has been transferred to Amory. **O. W. Hawkins,** roadmaster at Chaffee, Mo., has been transferred to Thayer, Mo., succeeding **F. R. Sullivan** who has retired after more than 34 years of service. **W. M. Davis,** assistant roadmaster at Thayer, has been promoted to roadmaster at Amory. **M. Day,** assistant roadmaster at Sherman, Tex., has been promoted to roadmaster at Lawton, Okla. **F. G. Gresham** has been appointed roadmaster at Chaffee. **H. G. Harmon** and **J. K. Moore,** roadmasters at Amory, have retired after more than 46 and 50 years of service, respectively. **F. S. Hunter** and **J. H. Langston** have been appointed assistant roadmasters at Memphis, Tenn., and Tulsa, Okla., respectively.

MILWAUKEE—N. E. Olson, section foreman at Lakeville, Minn., has been promoted to roadmaster at Savanna, Ill., succeeding **H. R. Von Haden** who in turn succeeds **Norman F. Kelsey,** roadmaster at Savanna. Mr. Kelsey retired recently after 49 years of service.

NEW YORK CENTRAL—J. H. King has been appointed bridge inspector on the Western district, with headquarters at Cleveland, Ohio. **C. F. Hunt,** division engineer at Columbus, Ohio, has been transferred to Utica, N. Y., succeeding **George Auer** who retired recently.

NORTH WESTERN—W. L. Waleen, chief engineer of the Minneapolis & St. Louis at Minneapolis, Minn., recently acquired by the North Western, has been appointed division engineer of the M&StL division, with headquarters remaining at Minneapolis. **C. W. Froehlich,** trainmaster on the M&StL at Minneapolis, has been appointed assistant roadmaster at St. Paul, Minn.

R. J. Christensen, assistant roadmaster at Worthington, Minn., has been promoted to roadmaster at Wall Lake, Iowa, succeeding **G. W. DuBois** who has been transferred to Eagle Grove, Iowa. Mr. DuBois succeeds **G. K. Sterling** who has been appointed assistant roadmaster at Worthington.

G. L. Hillman and **G. A. Johnson** have been appointed roadmaster at Oskaloosa, Iowa, and assistant roadmaster at Hutchinson, Minn., respectively.

READING—E. B. Sonnheim, assistant resident engineer at Philadelphia, has been promoted to resident engineer there, succeeding **Kingsley W. Ebert,** deceased. Mr. Sonnheim is succeeded by **Robert W. Wyatt.**

ROCK ISLAND—F. E. Detter, track supervisor at Fairbury, Neb., has been promoted to roadmaster at Cedar Rapids, Iowa, succeeding **W. R. Willhoite** who has retired after 42 years of service. **R. G. McManus,** track supervisor at Goodland, Kan., has been promoted to roadmaster at El Dorado, Ark., succeeding **D. C. Close,** deceased. Mr. McManus is replaced by **D. I. Troutner,** section foreman at Lincoln, Neb.

SOUTHERN—James H. Askew, Jr., has been appointed supervisor bridges and buildings at Valdosta, Ga., succeeding **Maynard L. Loy, Jr.,** who has been promoted to general bridge supervisor at Knoxville, Tenn. **Robert F. Cothran** has been appointed track supervisor at Charleston, S. C.

D. W. Brosnan, vice president—operation, Washington, D. C., and formerly chief engineer maintenance of way and structures at Cincinnati, Ohio, has been elected to the newly created position of executive vice president.

WESTERN MARYLAND—A. J. Davis has been appointed supervisor track at Cumberland, Md., and **Boyd H. Parker** has been appointed assistant supervisor track there. **T. L. Coberly,** supervisor track at Cumberland, retired recently.

Biographical briefs

James W. Dolson, 35, who was recently promoted to bridge construction engineer of the Missouri Pacific at St. Louis, Mo. (*RT&S*, Sept., p. 10), was born at Springfield, Mo., and graduated from Iowa State College in 1947. He entered railway service in January 1948 with the Pennsylvania as a junior track engineer at Wellsville, Ohio. Eight months later he joined the MP as a bridge draftsman at St. Louis. Mr. Dolson was promoted to assistant engineer in 1955, the position he held at the time of his recent promotion.

Stuart H. Poore, 58, who was recently promoted to office engineer on the Chesapeake & Ohio at Richmond, Va. (*RT&S*, Sept., p. 10), was born at Richmond and

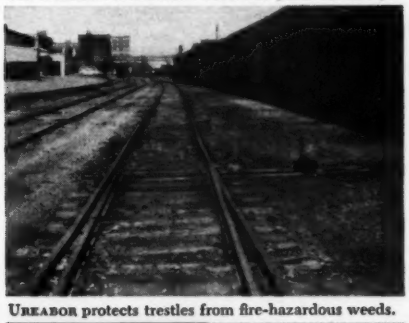
(*Continued on page* 51)

You can bet your budget dollars...

UREABOR stops weeds

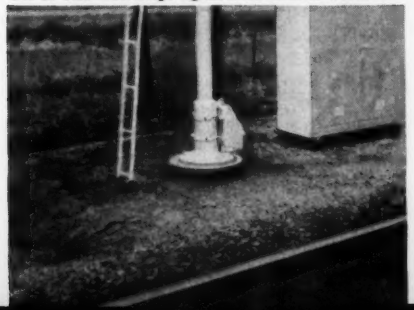
A low rate of application effectively destroys weeds and grasses... prevents regrowth. Easy to apply...nothing to mix...no water to haul. Nonflammable, noncorrosive, nonpoisonous when used as directed.

Use UREABOR to maintain weed-free yards for safety.



UREABOR protects trestles from fire-hazardous weeds.

Use of UREABOR keeps signal areas clear of weeds.



You can maintain weed-free areas anywhere at low cost, with the least amount of labor, by choosing UREABOR weed killer for the job... *that's a proven fact!* But you get other benefits too! Service, for instance. Only capable, experienced field personnel promote the sales of UREABOR. They can stretch your budget dollar for weeds because each man is thoroughly trained to solve every specific weed problem. You get sound advice, backed up by years of field experience, on how to make the most efficient use of our herbicide material. You also have a choice of hand-operated or power-driven mechanical spreaders. Equipment specifically designed to apply UREABOR to best advantage and to fit into every field use.

As you may know, U. S. Borax & Chemical Corp. pioneered the field of dry herbicides... with particular emphasis on railroad requirements. Continuing research over the years has yielded our successful scientifically formulated herbicides. Each gives outstanding results on vegetation... each makes use of the proved plant-destroying action of borates. So, for *your* weed problems, get the right answers. Get in touch with us today to get the *most* for your weed-killer dollar!

U.S. BORAX

630 Shatto Place, Los Angeles 5, California

SKELETONIZING

KERSHAW TWO WHEEL KRIBBERS IN TANDEM

WITH THREE

KERSHAW

MACHINES

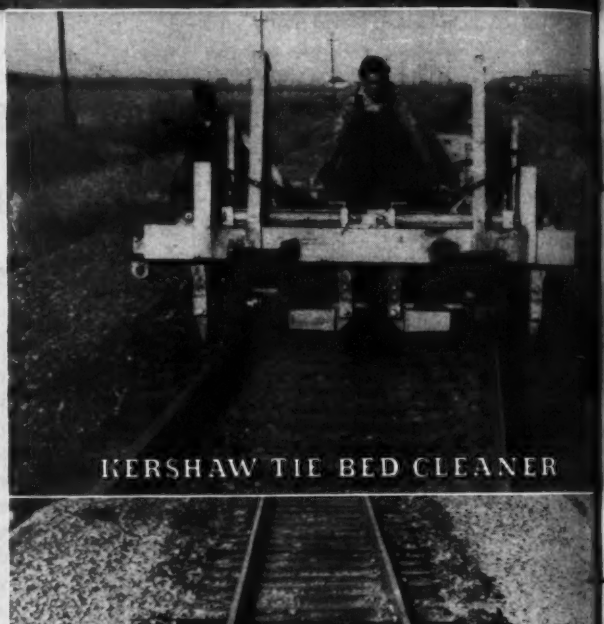
Here's a skeletonizing (ballast stripping) gang including only three machines that can maintain an average production of 400 feet of track per hour. All you need is two Kershaw Two-Wheel Kribbers and one Kershaw Tie-Bed Cleaner, and operators for each machine.

The Kribbers, working back-to-back in tandem, clean out all ballast from the center of the track and between the ties outside the rails. The Tie-Bed Scarifier, equipped with special feet to do the job, then removes the ballast from beneath the rail, even in cemented ballast conditions.

The result is the cleanly stripped track shown at right.

For additional details on these, and other Kershaw machines, contact any Kershaw representatives or call collect.

KERSHAW
MANUFACTURING CO. INC.
MONTGOMERY ALABAMA



KERSHAW TIE BED CLEANER

Needed—New ideas

Today, more than ever, the engineering and maintenance department needs men who will speak up. Ideas are needed for reducing costs and for speeding up and getting more work done. But the trouble is, many such ideas are now locked up in the minds of employees.

Many companies in other fields have "idea" sessions. The supervisory force is brought together and each one is encouraged to throw out ideas, such as how to alter a product to make it more acceptable or how to cut production costs. The one rule is that no one will criticize another's suggestion. Many good ideas have come out of these sessions.

Because railroad supervisory personnel is so widely scattered, it may not be practicable to have the "idea" sessions. The next best thing is to encourage employees to submit ideas to superiors.

The younger men, in particular, can do a great service for the industry. Not being steeped in the traditions of railroading they are in a position to see opportunities for improvement which may not be obvious to an experienced employee. The younger men will challenge a method for doing certain work or even of doing it at all.

More experienced employees will find that their ideas will be welcomed by top officers. The time is long past when men in such positions felt they alone knew what is best. They are now in a highly receptive mood for ideas that will advance the work of the department.

If an unworkable idea is presented, these officers will usually take the time to explain why it won't do. They will do this because they will not want to discourage employees from submitting further ideas. It's always possible the next idea might turn out to be a good one.

The AREA meeting— A question of economics

Can the American Railway Engineering Association afford *not* to hold an annual meeting, especially when an exhibit of manufacturers' products is scheduled to be held in conjunction with it?

This question is pertinent in view of recent action taken by the Association of American Railroads with reference to the annual meetings of its sections and divisions in 1961. The action came in the form of a "suggestion" that, in the interest of economy, each subsidiary group consider cancelling any plans for an annual meeting next year "unless there is a significant and over-riding reason for holding it."

While the AREA is, in one respect, an independent organization largely supported by dues from individual members, it also serves as the Construction and Maintenance Section of the AAR. As such it was subject to the "suggestion" pertaining to 1961 meetings. It was, therefore, up to the AREA to put forward a "significant and over-riding reason" why its 1961 meeting should not be cancelled.

Fortunately, there was another organization involved—the National Railway Appliances Association, which had scheduled an exhibit to be held in conjunction with the AREA meeting. Plans for the exhibit were already far advanced. A lease had been negotiated for exhibit space in McCormick Place, the new exposition center at Chicago. Heavy financial obligations had been incurred and a considerable sum of money had been paid out.

These facts regarding plans for the exhibit were brought out in a letter dated October 14 from Kenneth Cavins, NRAA president, to E. J. Brown, president of the AREA. The purpose of the letter was to present reasons why plans for the convention and exhibit should not be cancelled. In doing so Mr. Cavins built a strong case for the position that, from the standpoint of economy, there were substantial advantages for the railroads in permitting the meeting and exhibit to be held. This position is built on three principal arguments:

(1) That many entirely new materials and units of equipment, developed primarily to reduce maintenance costs, will be on display for the first time.

(2) That an exhibit provides a means of placing manufacturers' products before railroad men at less cost per capita than if the suppliers' representatives called at railroad headquarters.

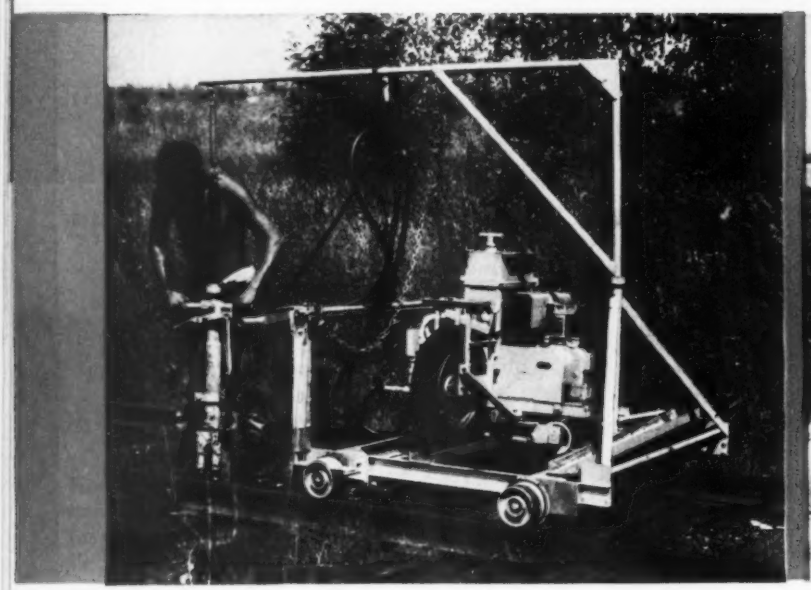
(3) That the opportunity of railroad men to see new equipment in one location at Chicago might actually be more economical for the railroads than if their representatives traveled to other railroads or the headquarters of the manufacturers to see the equipment.

At a meeting of the AREA Board of Direction at Chicago on October 24 the members voted unanimously that the 1961 annual meeting should be held. Concurrence in this decision from AAR headquarters came on November 2.

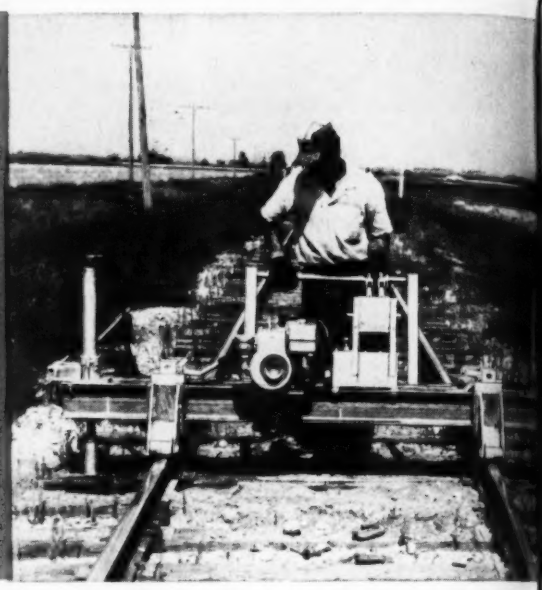
M/W supervisory officers can help justify this decision by attending the AREA meeting next March and making maximum use of the exhibition in the manner outlined by Mr. Cavins.

Minimum number of multi-use Nordberg

BRANCH LINE



NORDBERG HYDRAULIC SPIKE PULLER makes quick work of removing old spikes prior to removing tie plates and ties. Specially designed carriage adds greatly to high production and low operator fatigue.



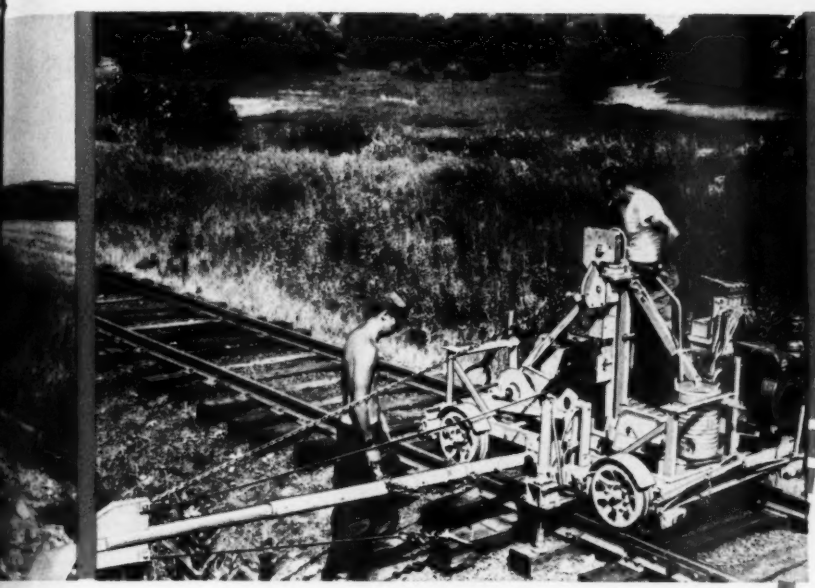
NORDBERG RAIL SNAPPER, with simple one man operation, is ideally suited for branch line work. A small, lightweight unit for raising both rails to either remove or insert tie plates in speeding up tie renewal.

NORDBERG GANDY-SNAPPER with boom in raised position, being used to quickly insert new ties. In addition to primary functions of tie renewal, this unit doubles as a versatile material handling crane.

NORDBERG SPIKE HAMMER makes driving spikes fast and easy to speed tie renewal work. Spikes are driven straight, vertical to the tie and to the correct depth, performing a better job at less cost.

Machines makes quick work of

TIE RENEWAL



NORDBERG GANDY-SNAPPER shown removing old ties on typical branch line tie renewal operation. Note "Snapper" hydraulic ram pushing down adjacent tie to lift rail and clear the "high wood" of tie being extracted.

...another example of ORGANIZED MECHANIZATION using money-saving MECHANICAL MUSCLES®

If low traffic and irregular service has been the "excuse" for neglecting branch line maintenance, it will pay you to take a look at this problem in the light of "Organized Mechanization" with Nordberg Mechanical Muscles.

For, with a minimum number of multi-purpose Nordberg Machines, you can do an efficient job at very low cost per mile. On branch line tie renewal, for example, the accompanying illustrations show how just four basic Nordberg units can be very effectively employed to efficiently handle a maximum number of tie renewal jobs, requiring a minimum number of men.

In these relatively simple operations, as in so many of the larger, more complex maintenance jobs, Organized Mechanization provides the most effective grouping of track machinery into efficient working teams. Here is a way of making the machines . . . which are individually efficient . . . even more productive—a way to handle specific maintenance-of-way jobs "better, faster and at lower cost."

Call or write for further details.

NORDBERG MANUFACTURING COMPANY • Milwaukee 1, Wisconsin

Write For LEASING Plans

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MODERN
concrete

On the new 703-foot Salkehatchie River trestle...

Atlantic Coast Line saved $69,000 with slabs and piles of prestressed concrete

Atlantic Coast Line trains cross the Salkehatchie River near Yemassee, S. C., at unrestricted speeds on one of the first major prestressed concrete slab railroad trestles in the United States. It replaces a short steel span and a creosoted timber trestle.

The $69,000 estimated savings in initial cost comes with mass production methods in prestressing that save labor. Construction is easier with prestressed concrete. Piles withstand real driving punishment. And prestressed concrete means less weight for the same load-carrying capacity, hence greater ease of bridge erection.

Low upkeep costs bring more savings. Concrete needs no painting to prevent rust. Prestressed concrete is setting a new pattern for trestles—for the Atlantic Coast Line and for other railroads across the country. Free technical literature on request. (U. S. and Canada only.)

PORTLAND CEMENT ASSOCIATION Dept. 12-27, 33 West Grand Avenue, Chicago 10, Illinois

A national organization to improve and extend the uses of concrete

NEWS NOTES . . .

. . . a résumé of current events throughout the railroad world

The ICC has approved guarantee of d loan of $4.5 million to the New Haven. The action came following a full day of conferences between representatives of the ICC and the various states served by the New Haven. The road had asked for guarantee of a loan of $6 million. New Haven President George Alpert said the loan will help "stave off" bankruptcy until the states can provide assistance or outright subsidy.

An automatic subway train is expected to be in revenue service in New York in less than six months. It will be a three-car train and will operate in shuttle service between Times Square and Grand Central. For several months the train has been operating on a section of line in Brooklyn on which the length (2,700 ft) and grades closely approximate those of the shuttle line. Although the train can operate without a crew, plans are to staff it with a conductor or attendent. Michael J. Quill, president of the Transport Workers Union, says he will demand "ironclad guarantees on job security" against plans for further automation on the city's transit lines.

A three-car, 360-hp "vacuum cleaner" that will move through subways at 10 to 15 mph has been designed by the New York City Transit Authority. Its function is to remove dirt, grease and litter from the roadbed and steel dust from the air. Bids for construction of the unit have been requested. Estimated cost: $320,000.

Class I railroads in September 1960 had a net income of about $25 million compared with $29 million in September last year and $73 million in the same month in 1958, according to estimates announced by the AAR. In the first nine months of 1960 net income approximated $303 million compared with $393 million in the first nine months of 1959 and $353 million in the corresponding period of 1958.

From a small town in Indiana half sections of completely assembled homes are being shipped on flat cars 2,200 miles to Pacific Northwest ports for trans-shipment by boat to Alaska. So far 200 homes have moved in this manner, with another 15 or 20 scheduled to move before the end of the year. The builder, Midwest Homes, Inc., corroborates the railroads' boast that the homes have been delivered on the West Coast "without so much as a crack in the picture window."

Private-Auto-Piggyback is now available to Southern Pacific patrons traveling between Portland, Ore., and Oakland-Los Angeles, Calif. This experimental service for passengers who prefer to have their own auto at destination provides only for southbound service from Portland. The cost to take a passenger and auto from Portland to California is three one-way, first-class fares.

WOOLERY

TIE-REMOVING TEAM IS STILL THE PERFECT COMBINATION FOR FAST TIE REMOVAL AT LOWEST COST, HIGHEST EFFICIENCY!

ILLUSTRATED BELOW: The Famous Model NU, WOOLERY Tie Cutter

Heavier rail and double shoulder tie plates have made the job of removing tie-ends an increasingly difficult one—but not for the WOOLERY team — the WOOLERY TIE CUTTER and the WOOLERY TIE-END REMOVER!

And still without trenching, jacking up track or disturbing the tie bed!

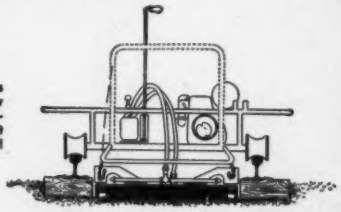
The WOOLERY Tie-Cutter cuts the tie on both sides inside the rail. The center section is then easily removed with tie-tongs and the Tie-End Remover moves in.

Maintenance men have discovered that welded rail, heavier rail, double-shoulder tie plates, *more* and *heavier* and *faster* trains have not slowed down WOOLERY efficiency.

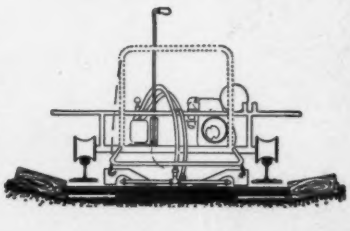
One man can still remove tie ends with no more effort than it takes to turn the air-valve on the Tie-End Remover!

It's done in less than a minute—in fact, it's so fast that the truly efficient team consists of TWO Tie-Cutters working ahead of the Tie-End Remover!

The WOOLERY Tie-End Remover consists of a double-ended hydraulic cylinder which drops into the tie bed left by removal of the center section. Note that there has been NO trenching or jacking! Keeps track smooth, safe!



A simple turn of the valve shoves the tie-ends outward—completely clear of the rail, pushing ballast ahead of it to open crib for the new tie! Hydraulically powered pistons work equally well and fast with single or double shoulder tie plates.



WOOLERY MACHINE CO.

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Replacing Trestle with Armco Pipe Costs Less Than Repairing It

New steels are born at Armco

Rather than make extensive repairs on an old steel beam trestle, a railroad replaced the failing structure with this 144-inch diameter Armco MULTI-PLATE® Pipe. Cost of replacement was less than the cost of repair. To assure long, maintenance-free life, the bottom of the pipe was paved. The complete installation was done by railroad personnel.

With Armco MULTI-PLATE, you eliminate painting, re-flooring, the danger of fire damage, and other costly forms of maintenance. You can remedy many kinds of drainage problems with the wide choice of MULTI-PLATE sizes and designs. Write us today for more information about these versatile, rugged corrugated metal structures. Armco Drainage & Metal Products, Inc., 5890 Curtis Street, Middletown, Ohio.

ARMCO DRAINAGE & METAL PRODUCTS

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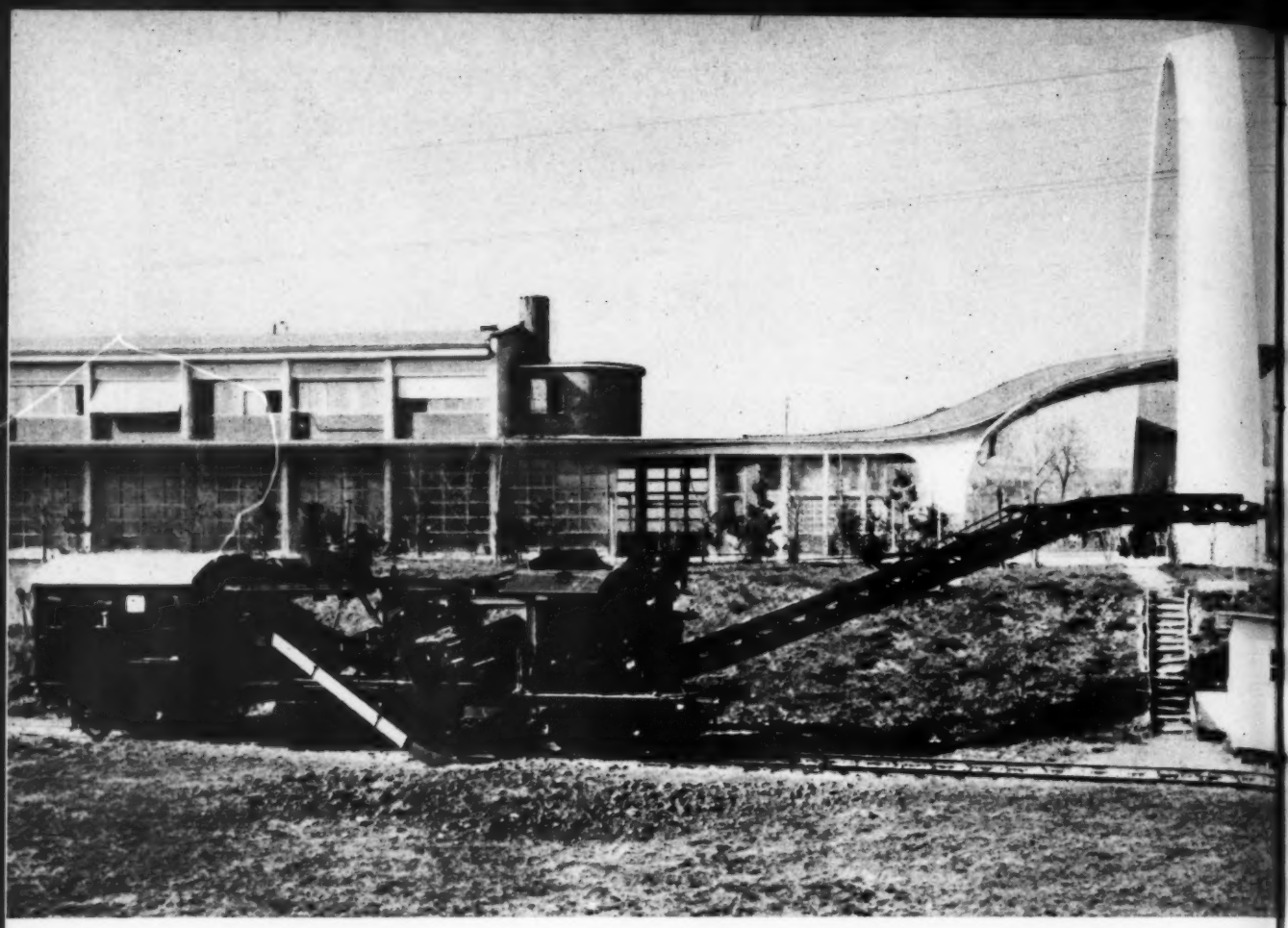


MATISA SINGLE UNIT BALLAST CLEANER

When you raise track to put in new ballast you merely create new drainage on top of old hardened ballast. For this some railroads estimate they pay $700 per inch per mile for the material alone.

The New Matisa SINGLE UNIT Ballast Cleaner *cleans* the *old* ballast perfectly and returns it to the track without disturbing the sub-grade, at the rate of up to 600 feet per hour.

The New Matisa SINGLE UNIT Ballast Cleaner also can be used to *lower* track—and gets to and from the job at up to 40 mph on its own traction motor trucks.

Available as a contract service, under lease, or as a purchased unit.

MATISA EQUIPMENT CORPORATION
1020 Washington Avenue • Chicago Heights, Illinois

PANEL IN SESSION: Left to right—W. J. Cruse, R. H. Beeder, C. E. Weller, J. L. Perrier (club president), G. M. Magee and L. Allen.

Panel discussion

Report on welded rail today

Members of the panel

Moderator:

C. E. Weller, assistant engineer maintenance of way, Illinois Central

Panelists:

R. H. Beeder, chief engineer system, Santa Fe

W. J. Cruse, engineer maintenance of way, Great Northern

L. Allen, general roadmaster, Monon

G. M. Magee, director engineering research, AAR

Many roads are now using continuous welded rail as a regular practice. What has been their experience with it? What about anchorage? Is it important to observe temperature limitations when laying long rails? Should buffer or closure rails be used? What should be done when a defect is found in a string of welded rails?

These and other questions were taken up during a panel discussion of the subject at a meeting of the Maintenance of Way Club of Chicago on October 24. Here is a partial transcript of the discussion which included answers to questions raised from the floor.

J. L. Perrier, president of the club, and a division engineer on the North Western, presided.

Weller: A subject I think we should discuss is anchoring. Not only do I want to ask the question on how are we anchoring welded rail but I think it's important to talk about how welded rail should be anchored in the future. Mr. Magee, will you tell us how you think welded rail should be anchored?

Magee: I think we're in a period of experimentation on anchorage. We've naturally started out to anchor rail on a conservative basis. Most railroads I think are following the practice of box anchoring every other tie in the intermediate portions of the rail. For 5 or 6 rails at the end they are box anchoring every tie or else putting one anchor against each tie in the end 5 rails to keep the rail joint from opening up and then just one on every other tie to keep the joint from closing up.

The only real advantage I can see in boxing-in each tie at the 5 rails is that if your joint opens it does tend to move the tie and unless you've got an anchor there to push it back when the joint closes you're not going to get any benefit out of that anchor in resisting the joint gap opening until you've opened up that amount again.

My own feeling on the matter is that from the standpoint of anchorage I would be inclined to box anchor every other tie throughout, use a short rail in connecting the continuous welded rail sections and box anchor that the same way on every other tie. It seems to me like that simplifies the matter from the standpoint of giving instructions to your track men. If you have a broken rail you have some place there where you can make your adjustments. If you have to lay the rail when the temperature is too high or too low you have a short rail you can work with to make adjustments.

I realize, however, that most railroads when they start putting in continuous welded rail want to get rid of all the rail joints they can. Instead of having short rails and 16 joints per mile, they would rather cut down to the eight. But it does seem to me there is a lot of merit in using a short rail between your stretches of welded rail and using every other tie boxed in throughout.

Of course from the standpoint of theory all you need to do is anchor the ends of your stretches. That is you can take a ¼-mile stretch of rail and box anchor every tie on the five rails

Continuous rail cont'd

at the end and that would be enough to hold the center part from any movement. The only reason that we put anchorage on the ties in the intermediate portions is merely for safety. In other words if you didn't have that anchorage to hold the rail from running into a sun kink why it would kick clear out to the right of way fence. On the other hand if you had a broken rail in the winter time and you didn't have that anchorage, you would have a very large joint gap with considerable hazard. So I personally feel that the application of these additional anchors in the intermediate portions is very good insurance for us to have with welded rail.

There are some railroads that are only box-anchoring every third tie in the intermediate parts and then box anchoring every tie in 5 or 6 rails at the ends.

There is an interesting experiment with glued joints we started on the Illinois Central this year. If you can depend on glued joints to hold the rail and not slip there would, theoretically, be no reason why you couldn't box anchor every other tie right through the string and depend on your glued joints to hold it from opening or closing. It remains to be seen whether that will work out that way or not.

Weller: Mr. Allen will you tell us about your experience with anchorage on the Monon?

Allen: The Monon has a total mileage of about 30 miles of welded rail. Our method of anchorage continues to be about the same as that which we started using about 1947. We box-anchor alternate ties. At the ends or the joints we box-anchor only on the pull-apart side of the unboxed alternate ties.

On our railroad the temperature is such that we feel pull-aparts are the greatest hazard we face with welded rail. Last winter we had our first pull-apart. This occurred in welded relay rail. That was surprising to me and at the same time interesting. The temperature was almost exactly zero. This joint was found to be open only 3 in.

Except for this one pull-apart we haven't had any trouble with our method of anchorage. I believe we should stay with this method until we find one better.

Weller: Mr. Beeder will you tell us how you're anchoring on the Santa Fe.

Beeder: We also are box anchoring alternate ties throughout the 1440-ft rail strings and then putting additional anchors on at the joints for five rail lengths in each direction. These are put on the side of the other alternate ties in the direction to resist the pull-apart. Of course standard box anchoring would make 6500 rail anchors per mile. With an average of eight joints per mile we have an average of 8 times 120 or 960 additional anchors per mile at joints. This figure, plus 6500, gives a total of 7460 anchors per mile.

Cruse: We're box anchoring six rail lengths from our closures and then in between we box every third tie. Also we use closure rails on our ¼-mile strings, that is, a single closure rail 37 ft long plus or minus, and on our insulated joints we use two closure rails. The reason is that we have had a number of pull-aparts or bent bolts the first few years in our continuous welded rail. In order to give us a little more holding power we have gone to this boxing every tie for six rail lengths both sides and it has cleared the matter up. Also we specify a rail temperature range at which our continuous rail can be laid.

Question: How do you eliminate your tight spots?

Cruse: That is one of the reasons we have gone to the closures so that, if necessary, we can make adjustments the following year after the track settles down. This closure rail is 37 ft, plus or minus, and there have been a few occasions when we have made some adjustments the following spring or summer when the rail temperatures got up around 70 or 75 deg.

Question: Where we have found it necessary to install an insulated joint we have had trouble sawing the rail. What's the answer to this problem?

Weller: I think that is one of the reasons you have to keep a record of your rail-laying temperatures. Where we tried to put in new insulated joints we would have difficulty in sawing the rail if the temperature was appreciably above the laying temperature. You would have to use a rail expander. By the same token, if you try to do any work when the temperature is appreciably below your rail-laying temperatures it is only natural that you are going to get some small opening, probably enough that you would have difficulty getting your bolts in.

Perrier: Mr. Cruse, you spoke about your closure rails being 37 ft long plus or minus. Would you keep a second set of rails handy so that in the winter you would put in your longer rails and in the summer you would change those rails out around the buffers and put in the shorter rail?

Cruse: That isn't necessary at all. Once the rail seats itself and you have got your anchorage up tight, which we do get today with anchor applicators that are being used, there is no need to carry spare rails for summer or for winter. I'd say that 99 per cent of our rail that is in—and we have quite a bit of it—does not have to be adjusted as a result of climatic changes.

What about laying temperatures?

Weller: Let us consider the question of rail-laying temperatures. Within what range of temperatures do you lay welded rail, and along with that question have you any limits that you put on working the rail after you have laid it? Mr. Allen will you tell us what you do on the Monon?

Allen: We had an actual test along this line in 1956. We had nine miles of welded rail to lay, which was begun

Areas of agreement

The panel was in general agreement on the manner in which welded rail should be anchored, and also on the importance of placing anchors tightly against ties. Several panelists spoke of the desirability of keeping a record of the temperature at which welded rail is laid and of referring to these records when working the track later. When defects occur in welded rail the panelists agreed that the problem could be handled either by cutting in a 39-ft rail or by drilling and applying angle bars.

about April 1. We used about eight weeks laying that nine miles of rail with a small gang. After the laying operation we proceeded to do an out-of-face surfacing and lining job on the track. The ties were already good before the rail-laying operation.

The ballast was good stone ballast. We added a small spread of stone to this track after all the accessories were picked up. We used power tamping equipment and raised the track with a smoothing lift of about 1½ in. During the laying operation we took an atmospheric temperature reading of the rail twice each day at about 10 am and 2 pm. These temperatures became a permanent record in our office on the rail chart.

In the surfacing operation it was found that when the atmospheric temperature approached 10 deg above that at which the rail was actually laid it was time to stop the surfacing work because the rail began to kink up pretty bad. Then you've got to get your track filled back in and line it up and discontinue the operation until your temperature gets down.

No set limits on Santa Fe

Beeder: On the Santa Fe we have no set limits temperature-wise for laying rail, except those that work themselves out from a practical standpoint. We have laid welded rail at 15 deg and we have laid it at 112 deg air temperature. Since it's pretty difficult to shake the men out of the bunk cars if it gets below 20 deg, I don't think we're going to lay very much rail at temperatures below 15 deg. We have had just about as many pull-aparts on the rail that was laid in one temperature as the other. As Bill Cruse said, much of that difficulty is on account of anchors not being up against ties, and with the advent of rail-anchor applicator machines a lot of that difficulty is going to disappear.

Cruse: We hold to rail-laying temperatures of 55 deg to 75 deg and we will not let them vary from that at all. This is near the mean temperature on the Great Northern. It is true it affects your rail-laying gangs. They may have to start earlier in the morning and maybe quit earlier in the afternoon and go back and do some back work. But as long as we're going to lay the continuous rail, we're going to stay with those temperatures simply because we've gotten away from trouble by doing it.

So far as working the rail is concerned our first advice is not to touch it if you don't have to. If you have a derailment or something of that nature —which we have had in our welded rail territory—there is no doubt you're going to have to do some cutting in. When we had one of them happen in the vicinity of one of our closures we took out a ¼-mile string and laid in 39-ft rails in order to get the track back in service. Since this was during our welding season we unloaded another ¼-mile string out there and, at the proper temperature, put it in. In this way I would say we salvaged probably 70 per cent of the ¼-mile string that was damaged; we cut off the damaged portion and used it at another location.

What temperature changes mean

Magee: I was thinking more about this matter of surfacing track. I do feel like the limits of temperature at which rail is laid is important because, for each degree change in temperature you have a stress change in rail of 200 psi. If you lay rail at 130 deg temperature—and rail can get to that temperature in the hottest summer weather—and if you are in a location where it will drop down to 40 deg below in the winter as it does on the Great Northern, you have a temperature change of 170 deg. When you multiply 170 by 200 you get a stress of 34,000 psi.

Now that is a lot of tension to put in rail in addition to the bending stresses you have in it. I think it would be very desirable to try and lay rail at somewhere near a mean temperature.

This emphasizes one of the advantages of using buffer rail. You can't lay rail at a mean temperature generally; you have got your rail gang out there and you have to go ahead and lay rail at whatever the temperature is. But if you use buffer rails and if it's too hot, it is not much of a job to come in and remove the buffer rail, loosen your anchors, and install a longer buffer rail to adjust the rail to the mean temperature at some later time. When you consider the rail is going to be in there some 15 or 20 years or longer, I think it is well worth it not to have to worry about having that compression force in your rail for surfacing in the summer, or excessive tension forces in the winter.

Cruse: I would like to add that we keep a record of the rail temperature when it is laid and use these records when making smoothing lifts of, say, 1 or 1½ in, and these have come in very handy in order that we don't lose control of the rail.

When defects develop

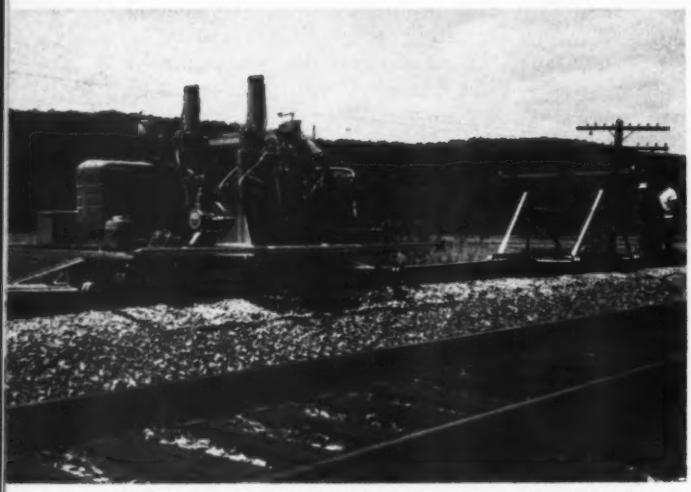
Question: What do you do when defects develop in welded rail?

Beeder: If we find a defect in a string of welded rail we cut in a 39-ft rail and put in two joints, but such defects so far are fairly rare. Of course we haven't found any transverse fissures or detailed fractures or any defects of that sort in any welded rail.

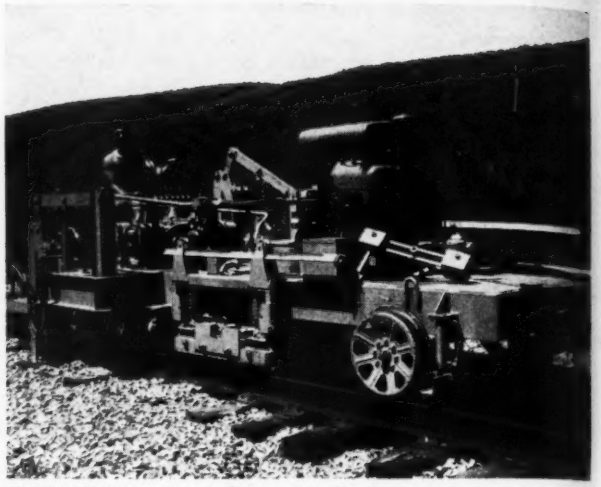
Cruse: Here's another way of handling it in an emergency if the temperature is out of line: You can drill the rail and apply a couple of bars and normally make safe track out of it. Then in the evening or at night you can go out there and cut in a 39-ft rail or whatever length you desire to have.

Question: Mr. Beeder, why do you cut in a 39-ft rail?

Beeder: It might be a 37 ft, 38 ft or some other length rail, but a 39-ft rail would be all right if it is properly anchored because the rail is not going to go any place anyway. Insofar as a low temperature is concerned, at the time the rail is inserted after a pull-apart or break, we've used a weed burner on many occasions to run back and forth on the track and direct the burner heads against the tops of both rails or one rail as the case may be to warm the rail up and take up the slack in order to get the gap closed. We've also walked along the track with oil torches and heated the rail in the same way. We've also used tumble weeds saturated with oil alongside the rail and been able to put the joint bars on in cold weather.



TRACK is raised to final grade by Super Jack-All working in conjunction with Trak-Surfacer. This operation sets pace for gang.



TIE SPACER brings ties to uniform spacing to accommodate the tamping machines. A trackman knocks off anchors, helps spot spacer.

Main steps in Erie's surfacing operation

(1) Loosen bolts ahead as necessary by trackman with track wrench. This is a very important operation to prevent buckling of rail because of changes in temperature. Loosening the bolts permits the rail to expand and contract.

(2) Raise the track to final grade, using the Super Jack-All and Trak-Surfacer combination with a foreman adjusting the surface ahead as necessary to provide desired raise. Two trackmen fork in some stone for tamping purposes. They also help spot the Jack-All at the desired raising point. An assistant foreman is assigned to adjust the wire to keep it within the desired position in the bracket on the Jack-All and also to change the position of the wire when running in elevation on outer rail of curve. One equipment operator is assigned to run this machine. This operation sets the pace for the entire gang.

(3) Three trackmen follow immediately

Erie formula for fast surfacing

- Careful programming
- Modern machines
- Departmental cooperation

By L. H. Jentoft

Assistant Chief Engineer Maintenance of Way
Erie-Lackawanna*

● Like most other railroads today, the Erie is faced with the problem of maintaining good surface, line and drainage at a minimum cost. An attempt has been made on our road to solve this problem by cycle programming of tamping and resurfacing work, using machinery and a minimum amount of maintenance of way personnel. This type of work was really started in the late 1940's and has been progressively improved throughout to the present time.

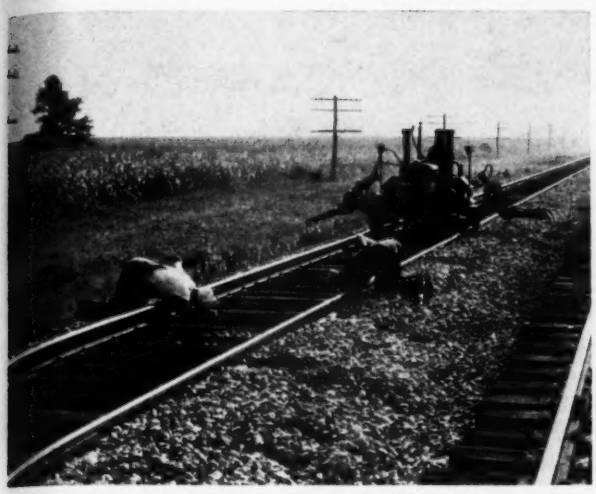
In the original mechanized gangs, the tamping machine proper was the basic machine. Track was still raised with small jacks by using ordinary spot boards and raising blocks to establish the new grade. The programmed jobs were short, covering only the track needing attention and then skipping to the next job. With that type of operation we were able to raise and resurface from 1000 to 2000 ft of track per day, depending upon the conditions and locations. This was a very good day's work in comparison to old methods using hand held pneumatic guns.

Serious study has been given to the problem of getting improved performance by adoption of many of the modern machines now available. As a result, at the beginning of the 1960 working season, Erie management reassigned its equipment to provide a mechanized outfit as complete as could be desired. This new outfit consisted of nine different machines and meant getting Erie-owned modern equipment into one high-powered gang. The basic change in the use of this machinery lies in the method of raising the track to new grade. This has been accomplished by using a power-jack "wire" for tamping the ties to the proper grade in conjunction with the raise.

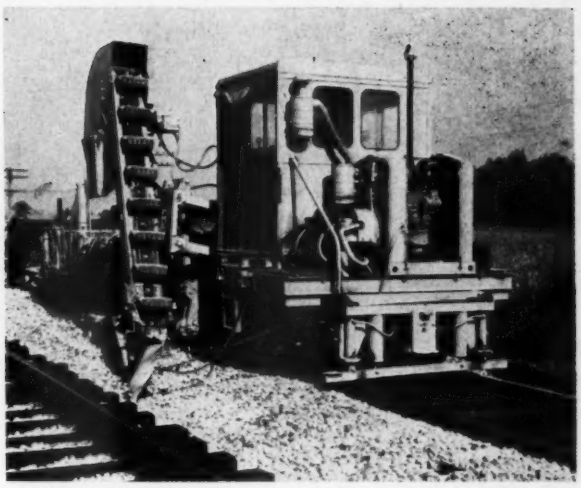
Size of ballast a problem

The size of Erie ballast provides a problem in the use of tampers. Many years ago our people thought the "high raise" to be the crowning glory of the

*Effective October 15 the Erie and the Delaware, Lackawanna & Western were merged into a single system known as the Erie-Lackawanna. This article was written before the merger became effective.



DEFLECTIONS are removed by another Jack-All. Two assistant foremen, one on each rail, work with this machine.



BALLAST is placed in cribs by a McWilliams Ballast Distributor in amount needed for proper tamping.

behind the raising operation to clean off tie plates, nip up and tamp loose ties that do not raise as the track is lifted with the Jack-All.

(4) Uniform spacing of ties is necessary to accommodate the tamping machines. Therefore, a Pullman-Standard Tie Spacer, operated by an equipment operator, is used. A trackman spots the spacer and knocks off and replaces rail anchors as necessary. This machine tows one push car with fuel-oil tank, one push car with machine set off, and one push car with miscellaneous tools and spare parts.

(5) Two assistant foremen follow with another Jack-All to take out deflections (one assistant on each rail). In addition this Jack-All tows an emergency Jack-All. Two additional trackmen are required to fork in stone and spot the tamper.

(6) A McWilliams Ballast Distributor places ballast within the tie cribs to the desired amount to accommodate proper tamping. A trackman, in addition to the equipment operator, is required to regulate the plow, raise the plow around obstacles and distribute sand on the rail ahead to provide necessary traction for the machine.

(7) The leading Pullman-Standard Power Ballaster, operated by an equipment operator, tamps every other tie, three blows per tie. (We had the tampers tamping al-

(*Continued on next page*)

- **Detour operation**
- **Close supervision**
- **Advance planning**

Using this formula, says Mr. Jentoft, a system gang, consisting of 9 machines and 27 men, has chalked up a working-season average output of 2.0 miles of track raised and surfaced per day.

track department, with 3 in being considered the perfect ballast size. This now makes it difficult to accomplish a light lift of 1 in. We have long since reduced our ballast size, but the 3-in ballast is still in evidence and will be for a long time and for this reason we find the Pullman tampers or the McWilliams tampers more adapted to handling our ballast. In order to further modernize this gang and to take the chance of human error and guesswork out of this operation, the old-style sight block and spot board have been eliminated by the use of the Nordberg Trak-Surfacer, which we operate in conjunction with a Kershaw Super Jack-All.

By the use of the above machinery, we have been able to speed up surfacing operations to the point where up to 2.50 miles of track have been raised within the span of an eight-hour working day, with a working season average of 2.00 miles per day.

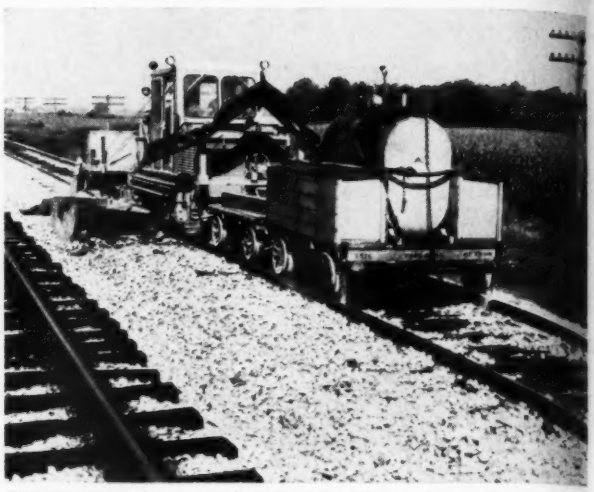
In order to tamp the track raised as above, an organization has been developed consisting of a foreman, 4 assistant foremen, 12 trackmen, 8 equipment operators, 1 work equipment repairman and 1 timekeeper, for a total of 27 men.

This force can be reduced further and with better results after some needed improvements in some of the equipment. Sanding devices have to be developed to eliminate slippage on some of the equipment. The fastest and most efficient equipment to fit the needs of the individual road should be used, regardless of manufacture. Additional desirable savings will be available.

Before detailing the individual operations of the gang, we desire to emphasize the importance of careful and well-planned programming and scheduling of the work. Consideration should be given to programming long jobs, 14 to 18 miles in length, and jobs in the same territory, to eliminate the loss of time in skipping and changing locations. The location of crossovers and the distance between crossovers are factors in scheduling each day's work and setting up detours. Detouring arrangements must be worked out well in advance and followed through by close cooperation between the M/W and operating departments. The superintendent and the division engineer have to work closely together as a team. You cannot outline the work and then go away and leave it to the track supervisor and train dispatcher to handle; if you do, trains will be delayed and/or the gang won't get started on time.

(Please turn the page)

POWER BALLASTERS, working in tandem, each tamp every other tie. Each tie is given three blows.



COMBINATION broom and Ballast Regulator cleans excess ballast from ties, then shapes ballast shoulders and intertrack space.

Main steps (cont'd)

ternate rails with good results and it is a matter of choice whether they tamp alternate rails or alternate ties.)

(8) The trailing Power Ballaster operated by equipment operator tamps every other tie, three blows per tie, and tows one push car with miscellaneous tools and fuel tank.

(9) A Kershaw combination broom and ballast regulator, with one operator, follows, cleaning excess ballast from tops of ties. This machine then shapes up the ballast shoulder and intertrack space to conform with proper standards.

(10) An assistant foreman, a trackman and an equipment operator follow with Nordberg Trakliner correcting the line on tangents and re-alining curves.

When lining curves the assistant foreman uses a sheet of graph paper showing ordinates of 1/10 in, 21 units to one degree of curvature vertically, with rail joints shown horizontally at ordinate stations. Curves are lined in three operations. First, the machine is operated over the curve and ordinates found, recorded and plotted on the graph, showing the present alinement. Then a free-hand alinement is sketched in to correspond with the proper degree of the curve. This shows the corrections. The machine then passes over the curve a second time

Formula for fast surfacing cont'd

Preparations for each job location in addition to detour arrangements should be worked out in detail in advance as to assembly points, tie-up points of the equipment, communications, refueling supplies, etc. Also tie renewals must be made well in advance. Necessary curve data must be checked out and made available. Any preliminary work at highway crossings, switches, crossovers, etc., must also be done in advance. Arrangements must be made to remove farm crossings as necessary ahead of the raising and restore them after the track is lined. Everything possible should be planned out and scheduled so as not to delay the production tamper operations. The rapid progress of the mechanized gang will quickly overtake any advance work not properly prepared, and result in reduced production. Ninety-five per cent of the work involved in handling each individual job is that put into preparation and planning.

Included in the above preparations and of first importance is the unloading of the stone ballast required on each job. This should be completed well ahead so that when trains are being detoured, work-train operations will not complicate the situation, or be subject to delays because of these movements in the territory.

A good stone dump is important to a good tamper operation. Too much or too little stone, or an irregular dump, if not within normal working limitations, can cause heavy work for the Ballast Distributor, slowing down its normal progress, which in turn will reduce tamping mileage. Reasonable care and the exercise of good judgment in unloading stone ballast will avoid this problem.

Eight to 12 cars of stone are normally required per mile. Taking an average of 10 cars per mile, with an average of two miles per day accomplished and on the basis of a 14-mile job, it would require 140 cars to be dumped a week ahead. This means that stone has to be kept coming on an orderly basis and dumped daily in order to keep ahead every day in the season. It is nerve-wracking while it lasts.

Fortunately, it does not take long to get a good season's work done on a division. On the Eastern District, where we first planned and prepared for this work, we started at Dalton, N. Y., on the Buffalo division on June 6 and finished programmed work at Paterson, N. J., on the New York division on August 12, completing 98 miles in 49 working days, including moves. The density of traffic was meanest between Corning and Binghamton, N. Y., and between Harriman, N. Y., and Paterson, N. J., with about ten trains a day being detoured. Delay should be eight to ten minutes per train. However, in congested territory it would run higher. It is important that the starting time of the gang be fitted and planned to meet proper scheduling of trains and changed from time to time as the work progresses and as changes take place in schedule time of trains.

Good programming, planning and thorough preparation, including a good stone dump, are the makings of good tamper mileage and high quality

TRAKLINER with Line Indicator corrects the line on tangent track and re-alines curves. An equipment maintainer accompanies gang at all times to keep machines in good condition.

and moves the track to conform to the correct alinement. In this operation, no stakes are necessary and no additional engineering personnel is required to provide a smooth riding curve. In heavy curve territory it is necessary to add a second track liner to take care of two miles of track.

(11) A maintenance of way equipment repairman is present at all times to keep machines in good operating condition.

In addition to the above, it is necessary for one man to carry water for the personnel in this gang. A timekeeper is provided to distribute time, keep records and make necessary reports.

The mechanic has a truck which is fully equipped with cabinets to carry spare parts, tools, etc. He uses this truck for transporting himself and one operator between the job and the house-trailer headquarters of the gang. An additional truck is used to carry men between assembly point and job.

work. However, as mentioned before in different language, in the final analysis, the payoff on premium mileage and quality is efficient and able on-the-job supervision. The best-laid plans may need on-the-spot revision and close coordination must be maintained with all concerned to insure a smooth operation and obtain top production.

Experience gained throughout the years of developing mechanized track maintenance operations has always pointed up the vital need for agressive and systematic maintenance of the work equipment. This factor is as vital as the day is long and it must be recognized that without the support of adequate maintenance and the presence of a capable and versatile repairman on the job, the high production rates and top quality standards cannot be maintained.

Once the outfit "gets the track" as prearranged, the men and equipment proceed on the track from the tie-up point to the beginning of the day's work, each machine in its proper position in the production line. It is important for the lead machine, the Super Jack-All with Trak-Surfacer, to get off to a quick start to make working space for the following machines. This machine is the pace-setter and it has to keep going to stay ahead of the tampers; any delay at this point will affect the entire outfit.

You cannot afford to lose as little as a second per tie. Did you ever stop to figure what the loss of just one second per tie amounts to in a day? About fifteen rails! However, once away to a good start, this lead machine can easily maintain a pace of 40 to 45 rails per hour and keep the outfit stretched out for proper working space.

Each rail length is numbered from the beginning of each day's work and the number is marked on the tie of the opposite track so that the pace can be readily checked at any time or place in the outfit. This also assists in determining where and when to stop the front and to allow for closing the last-stage operations in time to give up the track on schedule. Also, the spiral and curve elevations are marked out in advance so they are available for setting in with the Trak-Surfacer. It is important to give the track up on time because there is a train ready to go through on its own track.

Men are taught to stay off the live track; it is not necessary to occupy it or work close to it, so that it is safe to keep tamping and raising when trains are passing under slow order. We did not have an accident all summer. The men like it. They got so interested they ate lunch while working although a period of 30 min was allowed for lunch and the lunch time was not included in the hours worked.

Labor costs reduced

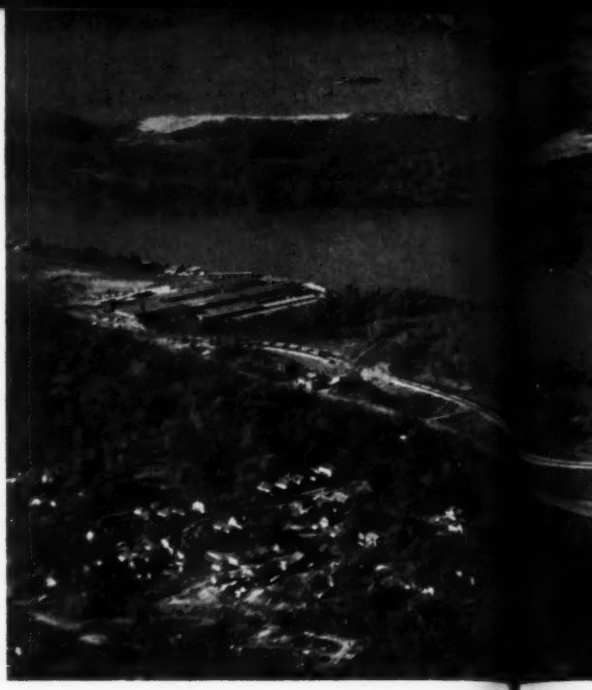
With the organization described at the tops of these pages, it is possible to tamp an average of at least two miles of track daily and completely dress it to proper standards, thus reducing the labor cost to approximately $265 per mile. In order to accomplish this, it is necessary to occupy the track for the complete eight-hour period of the working day. This can only be arranged by providing detour movements of trains. The installation of temporary crossovers at the extremities of the desired detours permits normal train operation without too much delay.

This method of operation cuts detours to a minimum length and, with the employment of temporary operators at the outlying crossovers, we are able to keep train delays to about one-third of what they used to be when working under traffic, and thus reduce the overall cost of surfacing operations. Stop to think about it a moment and you will recall not so long ago when the operating department would put up with slow orders for the equivalent of 400 days to accomplish 100 miles of track work.

This so-called "mechanized tandem Power Ballaster gang" provides a versatile combination of machines and the teamwork of skilled men, organized to perform high grade tamper work on a rapid production basis. It is another modern and progressive tool at the disposal of M/W officers on the Erie with which to maintain good riding track. Erie officers consider it another means of making the maintenance dollar go further, and plan on extending our one outfit to two next year.

In the words of an experienced trackman: "We sure cover a lot of territory and do it a lot easier and better than we used to."

NEW BRIDGE is located on a 2½-mile line change which includes 70-ft embankments and two shorter bridges. New line improved alinement between Quincy and West Quincy, Mo., on opposite sides of the river.



FIRST TRAIN crossed new bridge on October 21. Bridge consists of 6 deck-girder spans, 7 deck-truss spans and 1 through-truss span.

New bridge cut

No longer will trains of the Burlington be delayed by river traffic on the Mississippi at Quincy, Ill. The road recently completed construction of a 2500-ft high-level bridge to replace the old bridge which had a swing span over the navigation channel. The bridge is part of a 2½-mile line change which included two other bridges. Total cost of the project: About $10 million, paid in part by the government.

● On October 21 the first train crossed the Burlington's new 2500-ft bridge across the Mississippi river at Quincy, Ill. This event culminated about 1½ years of construction work which included, in addition to the long river crossing, two shorter bridges and a 2½-mile-long line change. The new bridge was officially dedicated on November 11.

The new, long bridge built as part of this project is a modern structure in every respect. Perhaps symbolic of its modern nature is the fact that the final two-thirds of the structure was assembled with high-strength bolts instead of rivets. The switch came about this way: When about one-third of the bridge had been erected using rivets for the connections between members it became apparent that a scarcity of experienced riveting crews would prevent the structure from being completed on schedule. At this point the contractor for the erection work sought and obtained approval from the railroad to use high-strength bolts for the remainder of the bridge.

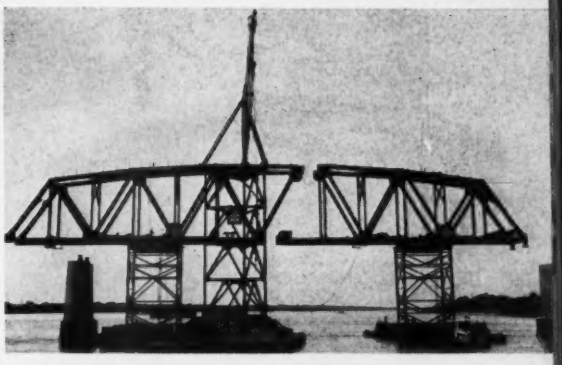
Located about 260 miles southwest of Chicago, Quincy is on the road's heavy-traffic main line to Kansas City, Mo. Prior to the construction of the new bridge, trains crossed the Misssissippi river over a low-level bridge which had a 358-ft swing span over the navigation channel.

The old bridge was originally constructed in 1869; the superstructure was replaced in 1898. It was 2100 ft long and consisted of 10 through truss spans, including the swing span, and one deck-girder span. Base of rail was at an elevation about 22 ft. above normal pool level. The bridge was located over water backed up by a dam below Quincy.

The navigation channel was located on the west (Missouri) side of the river, the swing span of the former bridge being the second span from that end. The channel was formed artificially by wing dams which diverted the natural current of the river to the west side. This caused river traffic to fight a strong cross current while approaching the bridge opening, resulting in relatively frequent collisions with various parts of the bridge. In fact, in 1948 the bridge was closed to traffic for three months after one of the piers had been struck by a line of barges being pushed by a towboat.

The road estimates that the bridge was opened for normal river traffic on the average of 7 to 10 times a day, not counting test openings. Each opening required approximately 30 min.

Construction of the new bridge came about as the result of an order from the Army Corps of Engineers to provide a clear channel width of 300 ft and a vertical clearance of 63 ft above normal pool. In addition, the Burlington was notified that the channel would be moved approximately



CHANNEL span (above) was assembled in two sections adjacent to piers. Deck-trusses (below) were erected on low bents set on barges.

cuts traffic delays

1400 ft eastward to the Illinois shore to conform more nearly to the natural flow of the river. Purpose of the relocation was to give river traffic a straight approach to the bridge opening.

Instead of modifying its existing bridge to comply with the order the Burlington elected to construct a new bridge on a different alinement. As a result, the federal government paid only a portion of the cost, amounting approximately to the cost of modifying the old bridge to meet the specified conditions. Total cost of the project was about $10 million, the government contributing about $2.4 million.

The decision to construct a new bridge was predicated on a number of considerations, including: (1) The fact that the existing bridge was nearing the end of its useful life; (2) the need for improving the railroad's alinement between Quincy and West Quincy, Mo., on the other side of the river; and (3) the troublesome delays to railroad traffic due to the need for opening the bridge frequently to allow river traffic to pass through.

The new river crossing is located 500 ft upstream from the previous bridge. There are 14 spans in its 2500-ft length—six deck girders (two 90 ft long and four 84 ft long), seven 228-ft deck trusses and one 336-ft through truss over the navigation channel.

The two other bridges on the line change are deck-plate girder spans and are located east of the river. One is a 716-ft, 7-span structure across Quincy bay. The other is a 296-ft, 3-span bridge across North Bottom road and the Burlington's Carthage branch. The bay bridge provides a vertical clearance of 50 ft above normal pool, which is more than sufficient to allow passage of pleasure boats.

All three structures are ballast-deck bridges designed for Cooper's E-72 loading in accordance with AREA specifications with slight modifications. To facilitate inspection of the deck-truss spans, walkways and ladders were provided. The track rails on the bridges are fastened with compression clips. The rail used on the line change is the road's standard 129-lb torsion-resisting section.

The three bridges are equipped with metal-grating walkways on both sides for the use of trainmen. Motor car setoffs are provided at intervals of 500 ft along the Mississippi river bridge. One of those, near the center of the bridge, is equipped with a telephone.

Portions of the embankment on the new line are about 70 ft above natural ground. To provide a stable foundation for the embankment approximately 500,000 cu yd of top soil was removed by the LaCrosse Dredging Corporation, the dredging contractor. About 3.6 million cubic yards of fill were required to construct the embankments. Most of the fill was obtained from material dredged out of the river and from an island between the river and the bay.

The substructures of the three bridges were constructed by the Kansas City Bridge Company, Kansas City, Mo., which also constructed the timber decks on the bridges. The abutments and piers of the river and bay bridges are supported on steel H-piles which extend to bedrock. Some of these piles are 170 ft long. The west abutment of the bridge across North Bottom road is also supported on steel piling. The east abutment and the piers of this bridge were landed directly on Mississippian limestone.

The contractor for steel erection, the Bethlehem Steel Company, moved onto the job in February of this year. One of its first tasks was the construction of a work harbor and an adjacent work area, including a dock. These facilities were located at the east end

REMOVAL of old truss span located over new navigation channel was started immediately after trains commenced using new bridge.

FINAL two-thirds of 2500-ft bridge was assembled with high-strength bolts.

New bridge cont'd

of the old bridge between it and the site of the new bridge. An 1100-ft siding was constructed by the Burlington to serve the facilities.

Actual erection of steel began in April when assembly of the trusses was commenced. Erection of the trusses and of the two shorter bridges progressed concurrently, the latter being completed during the summer.

All of the truss spans were assembled on barges anchored in the river adjacent to the piers on which they were to be placed. The through span was the first truss span to be assembled and erected. It was assembled in two sections, each section supported by a falsework tower mounted on two barges. Due to high water the early stages of the assembly work took place in the shelter of the work harbor. When the high water subsided sufficiently, the barges were towed out into the river and anchored between the piers on which the span was to be erected.

When the two halves of the through span were completed they were brought together and connected by rivets, while still supported on the barges. Approximately 45,000 gal of water were pumped into one of the barges to bring it to the proper angle and elevation for joining the trusses. A few days later the span was lowered onto the piers. This was accomplished by flooding the barges a sufficient amount to lower the span onto timber blocking about three feet high on the top of the piers. Four 250-ton hydraulic jacks, two on each pier, were then used to lower the span onto its bearings atop the piers.

The original plans called for lowering the span directly onto its bearings. However, due to the high water the barges could not be lowered sufficiently to make this possible.

With the through span in place the erection crews commenced assembly work on the deck-truss spans. For this work, the falsework towers used to assemble the channel span were dismantled and reconstructed as two low bents on each set of barges. Each set was then anchored alongside the appropriate piers and a deck truss assembled on it. These spans were landed directly onto their bearings on the piers. When one span had been placed the barges would move to the next span, moving around the other set of barges if necessary, so that assembly of that span could be undertaken. After each truss was in place on its piers the stringers were erected and the timber deck constructed. The ballast was then installed and the track laid across the span.

The switch to high-strength bolts came after the two east deck-girder spans, the through-truss span and one deck-truss span had been erected. A total of about 140,000 high-strength bolts was required to erect the final two-thirds of the bridge, placing bolts in all the holes that had been punched to receive rivets. Nuts for the bolts were run down by air wrenches set to apply the desired tension in the bolts. Twenty per cent of all the nuts were tested with a torque wrench as a check to assure the proper tension was being applied.

The only exception to the erection procedure outlined above is found in the procedure followed in erecting the last deck-truss span, which was placed over a portion of the old navigation channel. To keep the channel open for river traffic this closure span was assembled to one side.

To minimize delays to railroad and river traffic the closure span was installed on its piers as a complete unit, that is, with stringers, timber deck, and ties in place. The rails and ballast were added immediately after the span was landed.

Railroad traffic commenced using the new bridge the following day. This enabled crews to start removing the portion of the old bridge extending over the new navigation channel. One truss span was removed immediately by reversing the procedure used to install the new trusses. In this operation a barge with its hold partially filled with water was placed under the span. Water was then pumped out until the span, which had been cut away from the remainder of the bridge, was free of its piers. It was then floated to the material dock and cut apart for scrap.

Removal of this span permitted restricted use of the new channel by river traffic. The two adjacent spans were then removed to permit removal of the two piers within the channel. When that work is completed barges will have unrestricted use of the new channel. The balance of the old bridge, including the remaining piers, will be removed at a later date.

How good are ties in track today?

Since tie renewals generally have been declining for years and are now close to the record low, is it correct to assume that deterioration has taken place in the condition of ties in track? How do railroad men rate the condition of their ties today compared with ten years ago? Answers to these and other questions relating to crossties were contained in addresses presented during the recent annual meeting of the Railway Tie Association.

● In spite of the fact that tie renewals have been in a general downtrend since 1946, and have reached the lowest levels in history, the great majority of track maintenance officers say their general tie condition has not deteriorated in the last 10 years.

In fact, only one of 18 railroads queried on the subject said that such deterioration had taken place. Nine said that the tie condition on their roads had actually improved during that period, and eight said it had remained about the same.

These statements were contained in an address presented by M. H. Dick, editor of *Railway Track and Structures,* before the annual meeting of the Railway Tie Association. The meeting was held at the Statler Hilton hotel, Cleveland, October 26-28. The sessions were directed by D. B. Frampton, Jr., president of the RTA.

In discussing the subject, "The Condition of the American Crosstie Today," Mr. Dick first ruled out the theory that business conditions have been the dominant factor in the downtrend of tie renewals. In making this point he noted that between 1946 and 1955 tie renewals were generally going down even though net income of the railroads was moving generally higher.

The paradoxical situation created by sub-normal tie renewals without a corresponding decline in the condition of ties can be explained, he said, by a "combination of factors that are acting all at the same time to depress tie renewals without building up any great amount of deferred maintenance in the tie condition." He had ascertained these factors, he said, through interviews with numerous track men.

Heading the list, and by far the most important, is the cyclical factor. Heavy insertions of treated ties in the 'Forties established the pattern of an undulating tie-renewal curve that will extend far into the future. At the present time tie renewals are in a trough of the curve.

Will go up eventually

Track men realize, said the speaker, that the curve will turn up eventually, but most of them are not able to predict precisely when this will happen. None of the railroads queried expects tie renewals to recede below present levels. Eight expect their renewals to develop an uptrend sometime during the next several years, while 10 expect their tie insertions to continue at about the same level.

The almost universal use of machines for renewing ties was cited by Mr. Dick as another factor that track men say is helping to depress tie insertions. With tie renewals now generally being made by specialized and highly mechanized gangs most feel that the number of ties to be inserted per mile must come up to a certain minimum before it is economical to put the gangs to work. This minimum figure may run anywhere from 100 to 250 per mile.

The use of machines has reduced tie renewals for another reason, he added. "In the days when ties were renewed by hand it was generally necessary to shovel a lot of ballast in taking out an old tie and inserting a new one. This being the case it was a fairly common practice when a tie had been dug out to take out the one next to it, simply because it was easy and not necessarily because the tie was in bad shape. With machines, on the other hand, it's just as easy to take out one tie as it is a half dozen."

The high cost of labor and materials has caused track men to become extremely cost conscious these days, declared Mr. Dick, adding that this was another factor behind the downtrend in tie renewals. This state of mind has caused many roads to take a close look at their tie practices, particularly those that have a bearing on the number of ties inserted.

The result has been some interesting findings. "One is that the local people—supervisors, roadmasters and division engineers — are apt to be somewhat generous in their estimates of tie requirements. There are various reasons for this but the main one is that the local supervisor has a sort of proprietary interest in his territory; he wants it to be in first-class shape. With this attitude it is understandable that he might mark ties to come out that have several years life left in them."

On many roads, said Mr. Dick, the practice now is for tie inspections to be made by tie markers working out of the main office. The experience in general is that, under this system, fewer ties are being marked to come out.

Still another factor that is helping to hold tie renewals down without having an unfavorable effect on the over-all tie condition, Mr. Dick mentioned the use of means of making ties actually last longer, such as larger tie plates, better preservative treatment, dowells, tie pads and the incising of hardwood ties. "There is no doubt," he said, "that wide use of these measures is causing ties to stay in track longer now than ever before."

How ACL gets longer tie life

The importance of measures to prolong the life of ties was also brought out in an address by C. J. Plastre, chief tie and lumber supervisor, Atlantic Coast Line. Noting that the ACL has in excess of 23 million ties in track, which cost about $5 each installed, "it can be seen," he said, "how important it is to get long service life."

Explaining the tie practices of his road, Mr. Plastre said that "with the passing of hewn pine and cypress . . . we have turned largely to sawn hard-

Ties cont'd

woods." Because gum "is a very treacherous wood and is often decayed in the center while it looks good on the outside," the policy of the ACL is to season all gum ties artificially. Tests of gum ties seasoned in this manner show only four per cent decay in evidence after 13 years. From the original test of about 1,200 ties only 3 ties have been taken out of track.

Another ACL practice explained by Mr. Plastre is to incise all ties promptly after they reach the treating plants. The first service tests of incised ties were made in 1953 along with other ties that were not incised. "After seven years," he said, "incised ties are far superior in appearance to ties not incised. A recent inspection revealed 34 per cent less checking in incised sweet gum."

The road has taken a particular interest in hickory crossties, said Mr. Plastre. He has found that incising is also a definite factor in retarding checking and splitting of this species.

Other features on the program of direct interest to railroad men were an address by E. J. Brown, chief engineer of the Burlington Lines, and president of the American Railway Engineering Association, and a panel discussion on "The Future of Wood Crossties." With C. S. Burt, assistant to vice president, purchases and stores, Illinois Central, acting as moderator, the panel consisted of L. C. Collister, manager treating plants, Santa Fe System; K. C. Edscorn, tie and timber agent, Missouri Pacific; and E. L. Kidd, assistant to chief tie and timber agent, Seaboard Air Line.

All panel members agreed that the wood crosstie has a good future. According to statements made by the panelists, this conclusion is based on two major assumptions: (1) That the railway industry will form a vital part of the economy of the future, and (2) that no economical substitute material is available to take the place of wood for crossties.

Mr. Brown's primary purpose was to bring greetings from the AREA. In addition he told of measures being taken to get more service life from wood crossties. These include, he said, good ballast to allow for proper drainage and proper spacing of ties in each panel to assure a uniform bearing. He emphasized the need for careful handling of ties.

THIS TRAKLINER, with Switchliners hung from "A" frame, is ready for lining at turnout.

TWO SWIT

Wire 'sighting' device ada

An assembly of four hydraulic devices has been developed which make it possible to line track within the limits of turnouts with the Trakliner-Line Indicator combination. Personnel needed consists of lining machine operator and two trackmen.

● The Nordberg Trakliner, as used with the Line Indicator "wire," may now be adapted for lining track through turnouts and crossovers in either tangents or curves.

This is made possible through the use of newly developed hydraulic devices, known as Switchliners, which line the track independently of the Trakliner but which are powered from its hydraulic system.

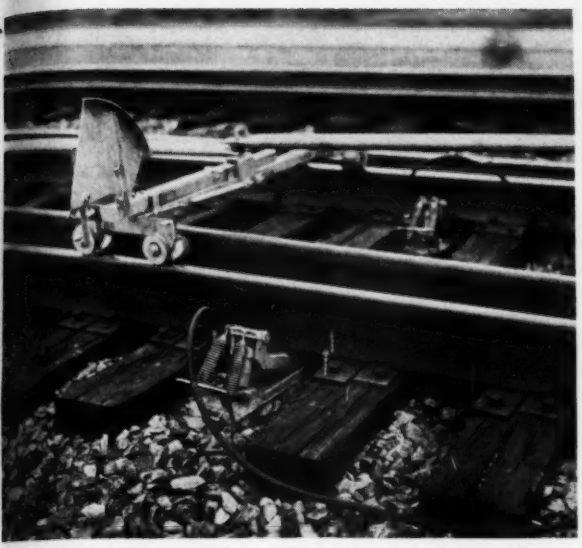
There are four Switchliners in each outfit. Each of them consists basically of a hinged plate mounted on a steel base plate with a diamond nonskid pattern on the under side. Mounted under one end of the hinged plate is a 4½-ton capacity hydraulic ram with a travel of 2½ in. Normal angle of the hinged plate to the base plate is about 15 deg. When the ram is fully extended the angle is increased to 30 deg. A coil spring returns the ram to its normal position when the hydraulic pressure has been released.

Lining a turnout with the Switchliners is accomplished by placing them in the cribs under the rails. When lining at points where it is difficult to move the turnout, such as at the heel of frog, all four Switchliners may be required to shift the track. On the other hand two may be sufficient in the vicinity of the switch point.

Generally speaking, when four of the units are used, two are placed under each rail. However, the arrangement will vary depending on conditions and on the particular part of the turnout that is being lined.

As part of the Switchliner assembly a hinged "A" frame is provided for attachment to the rear end of the Trakliner. When not in use the "A" frame is carried in the raised position by chains attached to the frame of the Trakliner; when lining a turnout the chains are lengthened to place the frame in the lowered position.

In this position the frame serves two purposes: (1) It carries a manifold with four outlets for providing hydraulic power to the Switchliners; and (2) it serves as a rack to carry the Switchliners when moving from spot to spot in the turnout.



TWO SWITCHLINERS in working position adjacent to indicator buggy.

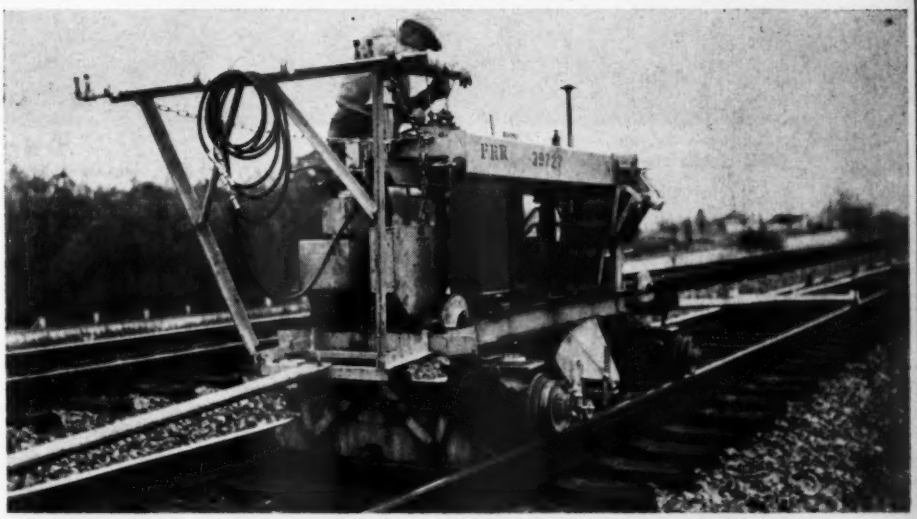
LOCATION of Switchliners is varied depending on thrust needed.

adapted for lining through turnouts

A single hydraulic hose, with quick couplings at each end, connects the manifold on the "A" frame with the hydraulic system of the Trakliner. Four hoses, also with quick couplings at each end, are provided for connecting the Switchliners to the manifold. Operation of the Switchliners is controlled by the Trakliner operator from his regular position on the machine, using the same operating lever as when lining open track.

When lining track with the Trakliner-Line Indicator combination a buggy with a pointer and scale is carried underneath the Trakliner. When using the Switchliners it is necessary, to allow the men adequate room in which to work, to remove the indicator carriage to a position behind the Trakliner. In making this change it is necessary to preserve the position of the indicator buggy relative to the length of the wire, that is 20 ft ahead of the rear buggy and 100 ft back from the front buggy.

To do this one of the spacer buggies ahead of the Trakliner is removed and the Trakliner is moved forward and coupled to the next spacer buggy. Next the coupling tube at the rear of the Trakliner is disconnected from the rear buggy and the indicator buggy, now removed from underneath the Trakliner, is attached to the end of this tube. A special coupling tube, furnished as part of the Switchliner assembly, is inserted between the indicator buggy and the rear buggy. It is said that only two minutes at the most are required to make the changes necessary to adapt the equipment for lining at turnouts.



TRAKLINER, with "A" frame in raised position and indicator buggy returned to its normal position under the lining machine, is now back at work lining open track.

In practice the track is lined in the usual manner with the Trakliner and Line Indicator from either direction up to the turnout, the last "throw" being made as close to the switch point or heel of frog as is conveniently possible. The necessary changes and adjustments to adapt the equipment for lining with the Switchliners are then made. The equipment is then moved through the turnout, doing necessary lining at the point and heel of switch, the heel and toe of frog and at intervals of about eight ties between the heel of switch and the toe of frog as indicated by the wire.

When lining through a turnout the Trakliner operator occupies his usual position on the machine. Generally speaking only two men are needed to handle the switchliners.

CNR dedicates new classification yard

On November 2 the Canadian National dedicated its new $15 million automatic retarder classification yard at Moncton, N. B. At the dedication Donald Gordon, the road's president, stated that the new facility will reduce the average yard time of freight cars from 24 hr to about 4 hr. The 830-acre yard has 40 classification tracks and 20 receiving and departure tracks. It will normally classify 1,400 cars daily but this rate can be increased to a daily peak of 2,000 cars. Cars can be humped at the rate of one every 15 sec. Facilities at the yard include a car repair shop (right center) and a $2 million diesel shop.

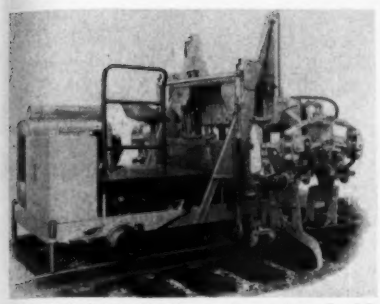
News briefs in pictures . . .

Russians inspect concrete ties

A delegation of Russian scientists recently inspected the Seaboard's concrete-tie installation near Tampa, Fla. They were accompanied by John P. Roebuck (front center), vice president, American Concrete Crosstie Corp., manufacturer of the ties.

New factory for Kohler Company

This 12-acre, single-story brick factory has been constructed by the Kohler Company, Kohler, Wis., for the production of engines and electric plants. Such units were formerly produced in one of the multi-story buildings in background.



THE IMPROVED Handyman is equipped with a precision level that can be used with existing wire or bioscopic surfacing devices.

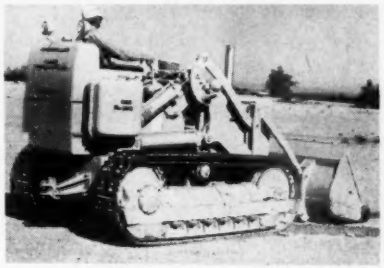
Improvements made to . . .

Track machines

GREATER efficiency and operating ease is claimed to have resulted from improvements made to the Kalamazoo Handyman power tamping jack and the Model 40 Ballast Equalizer. The improved model of the Handyman incorporates hydraulically operated tie nippers, designed to handle ties from 8 ft to 9 ft 3 in long, new vacuum brakes for fast, accurate indexing and a precision level that is designed for use with either existing wire or bioscopic surfacing devices.

The Model 40 Ballast Equalizer is equipped with a mechanical drive for operation of the track sweeper, eliminating the need for a second engine. It is available with either Ford Industrial power or the General Motors' (Jimmy) diesel engine. In addition, the machine incorporates larger axles, fully enclosed drive gears and air brakes. Like previous models, the Model 40 can be operated in either direction in order to move excess ballast off the track or shift the ballast from tie ends into the center of the track. Both ballast boxes and the plow are fully adaptable to requirements without mechanical adjustments.

A portable setoff is available which is designed to be easily set up, completely rigid and adaptable to most ground conditions. The setoff is designed to be assembled in a short time by two men. It is equipped with a system of braces and turnbuckles to make the unit steady under machines weighing up to 20,000 lb. *Kalamazoo Manufacturing Company, Dept. RTS, Kalamazoo, Mich.*



Power shifting for . . .

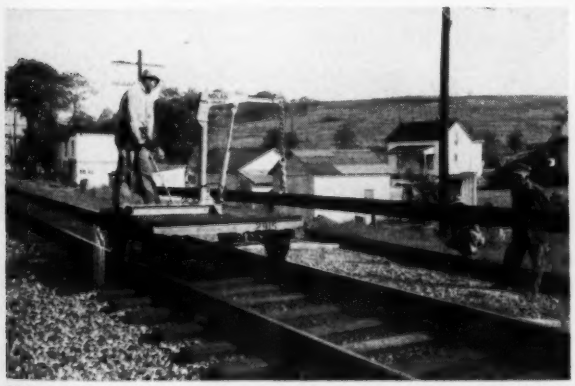
New Traxcavator

SINGLE-LEVER shifting through all phases of the work cycle is featured on the new Caterpillar 955 Series H Traxcavator. Powered by a turbocharged four-cylinder diesel engine, rated at 100 net hp, the new machine is stated to have 25 per cent greater productivity on many jobs than prior Traxcavator models. In addition, bucket capacity has been boosted from 1½ to 1¾ cu yd and the lifting capacity increased 23 per cent. The latter has been accomplished by the use of a new hydraulic system. Other improvements include an increase in the number of track rollers from 5 to 6, adoption of a heavy-duty undercarriage with welded track guiding guards, lifetime-lubricated rollers, a 52-gal capacity fuel tank and a more efficient and comfortable operator's compartment.

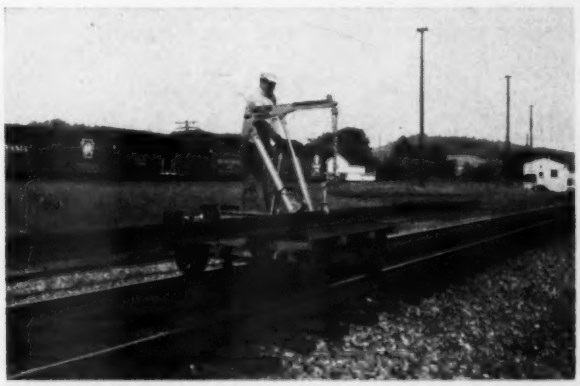
The new power-shift transmission utilizes a single-stage torque converter and provides four speeds in both forward and reverse. The gear selector control lever is mounted forward of the left arm rest and is equipped with a safety gate lever which locks it in the neutral position. Controls in the operator's compartment are grouped on a center column with a throttle lever located on each side to permit operation with either right or left hand.

Features from previous models incorporated in the 955H include automatic bucket positioner and kickout, 40-deg tilt back and 47½-deg tilt at maximum lift, three grouser track shoes and hydraulic track adjusters. Dumping height of the machine is 130 in, with a dumping reach of 41.2 in at a 45 deg discharge angle.

A full line of attachments is available, such as side-dump, light-material, heavy-material, quarry, and skeleton rock buckets; bulldozer blade; ripper; pulpwood, lumber and log forks and hydraulic control arrangements for front and rear-mounted attachments. *Caterpillar Tractor Company, Dept. RTS, Peoria, Ill.*



RAIL LOADER raises rail by continuous operation of the hoist's hand pump until rail is above deck of the push car.



MAST of loader is tipped backward to swing rail over push car. Restricted flow of oil controls lowering operation.

Operates from push car . . .

Rail loader

ONE MAN can quickly load rails on a push car, it is claimed, by means of the Nolan hydraulic rail loader. The loader operates from the deck of any make of push car and consists of three sections, the hoist, a base with hand pump, and rail clamps and chains. It weighs 290 lb assembled.

To raise a rail from the ground onto the push car the rail first is dragged by the hoist into position for lifting. The rail is raised by continuously operating the hand pump until the rail is above the deck of the push car. Continued pumping tips the mast of the loader backwards to swing the rail over the push car. The rail is lowered onto the deck by moving the pump lever to the extreme forward position. A restricted flow of oil controls the lowering operation. *The Nolan Company, Dept. RTS, Bowerston, Ohio*

WHAT'S THE ANSWER?

Tight gage from slewed ties

What causes crossties to slew enough to result in tight gage? Explain. How can this condition be corrected?

Use more anchors

By LEE SPENCER
Track Supervisor (Ret.)
Long Island Railroad
Scottsdale, Ariz.

There is only one explanation for the slewing of ties, insufficient and inadequate rail anchorage, allowing one or both rails to creep or run. This is generally most prevalent in track using slotted joint bars under the old theory and hope that these joint bars would also suffice as rail anchors. The remedy is equally as simple, sufficient and adequate anchorage to hold the rails from creeping.

Anchor both sides

By L. G. LAWSON
Roadmaster
Canadian National
Melville, Sask.

Crossties slew enough to make tight gage for several reasons. Old-type slotted joints with running steel and ties not anchored on the end opposite the joint are the most common reasons for slewed ties. Another is that, with certain types of rail anchors, one may become loose and creep away from the tie, which often hapens when insufficient anchors are applied. Another reason is that sometimes a tie plate is spiked so that it fits slightly skewed with the rail. This, in turn, sometimes causes a tie to slew. Another reason is centerbound track.

Wherever the slotted type of angle bars are still used, which is mostly in sidings, yard tracks or secondary branch lines, the ties opposite the joint should be box-anchored. Also, sufficient anchors should be added to prevent movement in either direction.

Careful checking of anchors to see that none is loose will take care of the slewing of crossties caused by a loose anchor. Again more anchors are required when this condition exists as the rail will be moving back and forth.

A carelessly spiked tie plate, where the end of the shoulder is tight against the rail on one side and away from the rail on the other, can easily be avoided by using more care. This is more common on single-shoulder tie plates and especially where spikes are tapped against the rail when spiking. This can be eliminated by careful spiking.

Centerbound track should be corrected as quickly as possible wherever it exists because slewing of crossties is only one of the dangers of this type of track. Poor surface is always prevalent. Tamping the same distance inside as outside the rail should always be adhered to with not too low a trim left in the cribs.

Many factors

By THOR MONROD
Section Foreman (Ret.)
Northern Pacific
Billings, Mont.

There are many contributing factors which enter into this question. It, therefore, takes some careful study to arrive at the proper solution. The following are the most usual contributing factors which will cause slewed ties:

(1) Rail anchors in insufficient amount, faulty in themselves or in their application, particularly if not applied in an equal amount on each side of track. This would let rails run more on one side than on the other, thereby taking the ties with them.

(2) Faulty ballast with not enough bond to insure compact surface bearing for the ties, or else insufficient ballast to prevent the ties from shifting.

(3) Poor drainage will foul ballast. Also, poor subgrade over soft spots and swampy

NEW QUESTIONS to be answered in March

Do you have an answer to any of the questions listed below? If so, send it in. Payment—based upon substance and length—will be made for each published answer. If you wish your name withheld, we'll gladly comply.

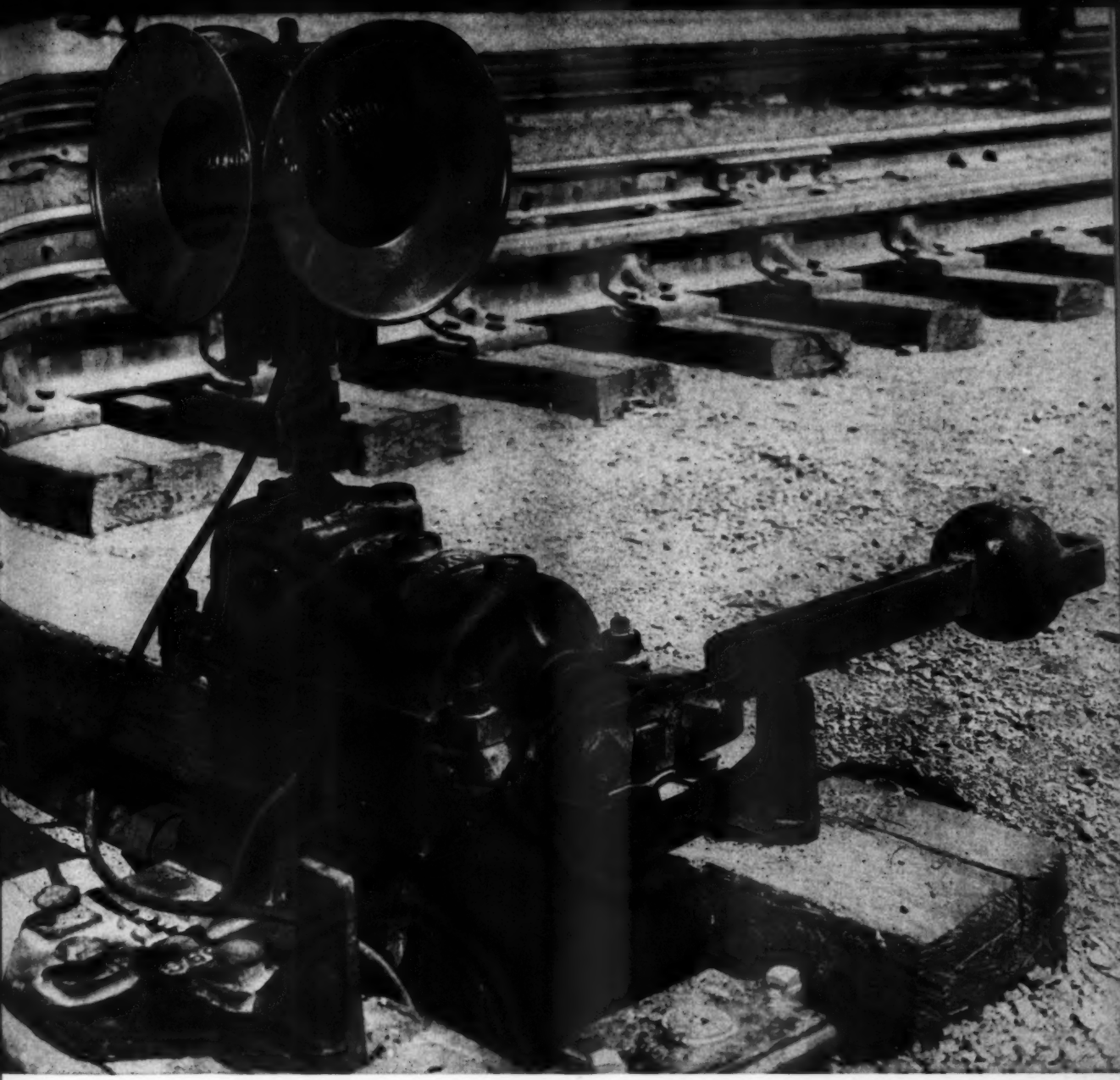
DEADLINE: January 30

- 1. What is meant by preventive track maintenance versus corrective maintenance? What are the advantages and disadvantages of each? Explain.
- 2. What is the best work procedure for making underwater repairs to masonry substructures? Explain. What equipment is required and how should it be used?
- 3. Some roads still unload and pile crossties at station grounds, then distribute them by truck or by motor car and push cars. Isn't it more economical to distribute ties directly from the cars in which they are delivered, either by work train or local freight?
- 4. Is there any advantage in using water for puddling when back-filling around bridge and building foundations? Any disadvantages? How much water should be used? What better method can be used?
- 5. Is the M/W ratio (percentage of maintenance of way and structures expenses to operating revenues) a sound basis for measuring the effectiveness of a maintenance-of-way department? Explain. If not, are there other and better yardsticks that may be used for this purpose? Explain.

Send answers to:

What's the Answer Editor
Railway Track & Structures
79 West Monroe Street
Chicago 3, Illinois

Do you have a question you'd like to have answered in these columns? If so, please send it in.



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What's the answer? (cont'd)

ground will loosen ties and cause them to slew as will also their proximity to a bridge, where rail running is more noticeable.

To remedy this a close inspection must be made to find out what actually caused it. Straighten out and renew any badly damaged or slewed ties and track fastenings. Place track in correct gage, reset and replace all rail anchors, apply new anchors for faulty ones and place any additional anchors.

Track at these locations should be placed in as good a surface and line as possible. Also, if necessary, additional new ballast should be applied. If the slewed-tie condition was brought about by poor drainage, it also would have to be rectified.

Caused by new ties

By R. H. BECKER
Section Foreman (Ret.)
St. Louis-San Francisco
Festus, Mo.

The slewing of ties occurs mainly when new ties are inserted. The fact that the ballast is loosened when ties are inserted may be a consideration in the slewing of new ties. Another has to do with the fact that new ties are nipped up tight to the rail and the spikes are driven down tight. Hence, since the spikes in the old ties will be free for the rail to run, it is the new ties that take all the pressure when the rail expands. This will cause the ties to slew resulting in tight gage.

This will happen whether you are spotting in your ties or are giving the track a light raise. The answer, in my opinion, is to avoid driving the spikes down too close.

How to repair diagonal bracing

What, if anything, should be done when the lower ends of both the diagonal bracing members of a timber bent are so decayed that the bolts are ineffective? Explain. How long can such work be deferred? Explain.

Make repairs at once

By H. A. LA CHAPELLE
Engineer of Bridges & Buildings
Green Bay & Western
Green Bay, Wis.

The diagonal bracing members of a timber bridge are an important part of the bent, and if the piling are not to be re-driven for a number of years the bracing should be replaced with new timber.

Should the bridge be in such condition that it would be replaced in a year or two, I would remove the decayed end on the brace and bolt a 4-in by 10-in brace on top of the old brace and through the center and track piling, and then place a 4-in by 10-in filler between the new brace and the end pile and bolt to the end pile.

This work should be done at once, as the diagonal braces are necessary to hold the bent in a rigid position.

Don't defer if traffic heavy

By W. J. HUNTSMAN
Supervisor of Structures
Denver & Rio Grande
Grand Junction, Colo.

When the timber decays so there is no support from the bottom bolt, the bolts that are higher will take the strain. But as time goes on and this trouble is not corrected, the posts will work on the sill and under the caps. This has a tendency to make a bridge unstable when traffic is on it, causing the track to go out of alinement and the structure to move from side to side.

If this condition is left unattended the life of caps and posts will be shortened. The piles or posts start to sway, then caps and posts will wear where they meet. Also the posts will wear on the sills. In addition the piles will work in the ground and have a tendency to drive.

I believe that all diagonal bracing should be kept in good repair on all main-line bridges where the traffic is heavy. This work should never be deferred; the bolts should always be kept tight and the braces in good condition.

Diagonal braces are the key to a solid bridge. The less movement in your bridge the longer it will last. If this work is deferred, the structure should be closely watched. Where the traffic is heavy, this work should never be deferred.

Depends on conditions

By V. W. HUTCHINGS
Bridge & Building Supervisor
Southern Pacific
Bakersfield, Calif.

There are several conditions that have to be given consideration in connection with this question. They are: The type of bents (framed or pile), where located (main line or branch), height of bents and number and condition of piles.

On all frame bents, and on five-pile bents on the main line, braces should be renewed soon. We use 4-in by 10-in creosoted material with two bolts in each post or pile.

On branch lines, on five-pile bents, we splice the braces by placing a 4-in by 8-in piece on top of the old brace.

On branch lines, on four-pile bents, we renew the bracing, for in the majority of cases the bolts are worn and cannot be tightened. These can be repaired when a gang is in the vicinity.

We have had no decay in braces on six-pile bents, but if we did have, we know of no reason braces should not be spliced when a gang is working in the vicinity.

Describes specific job

By C. F. INTLEKOFER
Assistant Bridge Engineer
Great Northern
Seattle, Wash.

When the lower ends of the diagonal braces of a timber bent are decayed, repairs should be made by replacing the braces or by cutting off the decayed portion and replacing it with a short piece of new brace, splicing it to the piece of old brace which remains.

For bents of low height, it is usually best to renew the entire brace when its lower end becomes decayed. For higher bents where the braces involved are long, say greater than 20 ft, it may be satisfactory to splice a new piece of material to replace the decayed lower end of a diagonal brace. The

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butt joint of the new and old braces is made with a timber splice plate about four feet long covering the joint.

The most economical method should be selected, keeping in mind that the brace, after repairs, should last until the bent has to be replaced. The manner in which the decayed braces are fastened to the bents also enters the picture. If a brace is bolted to the bent, it can be removed readily, and without damage to the piles or posts. However, if the brace is fastened to the bent with spikes, then the brace will be destroyed in removing it, and the piles or posts will also be damaged in pulling the old and driving the new spikes.

We have a long frame trestle of 150 untreated bents about 18 ft high which has a number of braces (24 ft and 26 ft long) decayed at their lower ends. We are recommending that the braces be cut off square where they pass the No. 2 post, and that a new 7-ft piece of brace be placed to make a butt joint with the old brace, and to be spliced with a steel plate. The plate will be 3 in by ¼ in by 1 ft, with a hole for a ¾-in diameter bolt 2 in from each end. The bolts will go through the splice plate, the braces, and the post. This arrangement will let the brace take tension and compression through its full length. Use of this device is unusual, but in this case, the steel plate will serve as a splice plate and connection to the post, and will cost less in place than a timber splice plate.

In answer to the question of how long the repair of braces, with their lower ends decayed, can be deferred, I would say that in general this work should not be deferred. If the bent needed the full-length brace when it was new, it needs it more than ever now that it is getting along in years. Certainly a frame bent should always have its diagonal braces in good condition. A brace which is ineffective in its lower portion may partially serve its purpose because the sound portion is connected to piles and the cap. A driven pile bent, low in height, with good pile penetration and pile batter, may have brace-repair work deferred for several years. But high bents, or bents with poor pile penetration, or located on a side hill, or on fast track, or on a curve or in a sizable stream, should always have diagonal braces in good condition.

Using 'helper' piles in bents

Under what conditions is it advisable to drive "helper" piles in a bent of a timber bridge? Explain. How is this done? What is the maximum number of such piles that should be used?

Five conditions

By A. E. Burford
Supervisor Bridges & Buildings
Illinois Central
Memphis, Tenn.

Following are five of the more common conditions that may make it advisable to drive "helper" piles:

(1) Insufficient penetration of piles caused by scouring.

(2) Deterioration of the majority of piles in a bent.

(3) Bridge out of line a sufficient distance to become hazardous.

(4) Continuing settlement of a bent sometimes makes it necessary to drive longer "helper" piles than those originally driven.

(5) Accidental damage to some of the piling in one or more bents.

If it is a ballast-deck bridge, it would be necessary to remove the ballast and floor boards from the section of the bridge where the "helper" piles are to be driven. Then remove the brace planks from one side of the bent, shift the stringers where necessary and place the pile in position where it is to be driven. After the pile is driven it should be cut off and jacked into position under the cap, then secured to the cap with a drift pin. After all "helper" piles are driven in the bent, brace planks should be replaced, stringers put back in proper position and the floor boards and ballast replaced.

In driving "helper" piles in open-deck bridges, all that is necessary is to remove braces from one side of the bent, shift the ties and stringers so "helper" piles can be placed in position. After pile is cut off and secured to the cap, replace brace planks and shift ties and stringers back to proper position.

In general, considering a standard six-pile bent, no more than three "helper" piles should be added to any one bent. Should the condition of the bent be such that more than three piles are necessary, a complete new bent should be driven.

Prefers stubbing

By J. E. Heck
Supervisor Bridges & Buildings
Chesapeake & Ohio
Ashland, Ky.

I do not favor driving "helper" piles in bents of timber bridges as I don't like to clutter up the ground or streambed with pile stumps which will interfere with future out-of-face renewals.

Some times, however, it becomes necessary to strengthen or reinforce one or two bents in a bridge when the general condition of the entire structure indicates several more years of life. I prefer, in such cases, to double-cap, if that will cut off the defective part of the bad pile or piles, or stub in a sound piece of timber fastened with bolted scabs and braces if the defective condition extends downward below the cut-off for a double cap but does not go below the ground line. Stubs should be limited to one in a four-pile or five-pile bent and limited to two in a six-pile bent, with at least one sound pile between them.

One occasionally encounters conditions such as extensive heart decay in a few piles scattered through the bridge, ice action on piles in flowing streams, earth removed from around piles by erosion or excavation, underdriven piles which do not have the required bearing strength, or overdriven piles in shallow penetration where the tips are broomed so badly that the piles keep going down under heavy traffic. In these cases, double caps or stub timbers will not serve the purpose satisfactorily and "helper" piles are the answer.

There are several ways to drive "helper" piles. We sometimes loosen the cap and move it out of the way while we drive the helper pile in line

(Continued on page 43)

PROGRESS REPORT

SPENO

Here are the up-to-date facts on the SPENO Ballast Cleaning and the SPENO Rail Grinding Services.

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SPENO Engineering and Research has developed a superior screening arrangement so that we are now using an improved Ballast Cleaner with greater efficiency.

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Our Rail Grinding Service has been so well received we are now building a *THIRD* Rail Grinding Train to take care of the increased demand.

SPENO is constantly developing means for better service to make sure that the Railroads receive everything they pay for — and more

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All necessary parts are ordered as a unit. They are received in an individual carton which facilitates handling, storing, inventory, and filling requisitions.

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Because of the labor costs involved in opening an insulated joint, you can stretch your maintenance dollar by renewing all of the fibre parts at one time.

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A complete renewal set of RAJO parts will provide a better fit and longer fibre life than is obtained by piecemeal replacements.

RAIL JOINT COMPANY, 50 CHURCH ST., NEW YORK 7, N. Y.
DIVISION OF POOR & COMPANY (INC.)

What's the answer? (cont'd)

(Continued from page 40)

with the other piles in the bent. It is not practicable to do this in some cases, however, due to bad spacing of the existing piles in the bent or to the ground being crowded with old pile stumps. Then we dirve two piles, one on each side of the bent, and cross-cap them under the existing cap.

I see no reason to limit the number of "helper" piles in any bent if they are driven in such a manner as to permit the installation of suitable braces.

Classifying recovered rail

What classifications do you have for rail picked up after a rail-laying project? What are the determining factors for these classifications? Explain. Is the rail classified in the field or at the stores department?

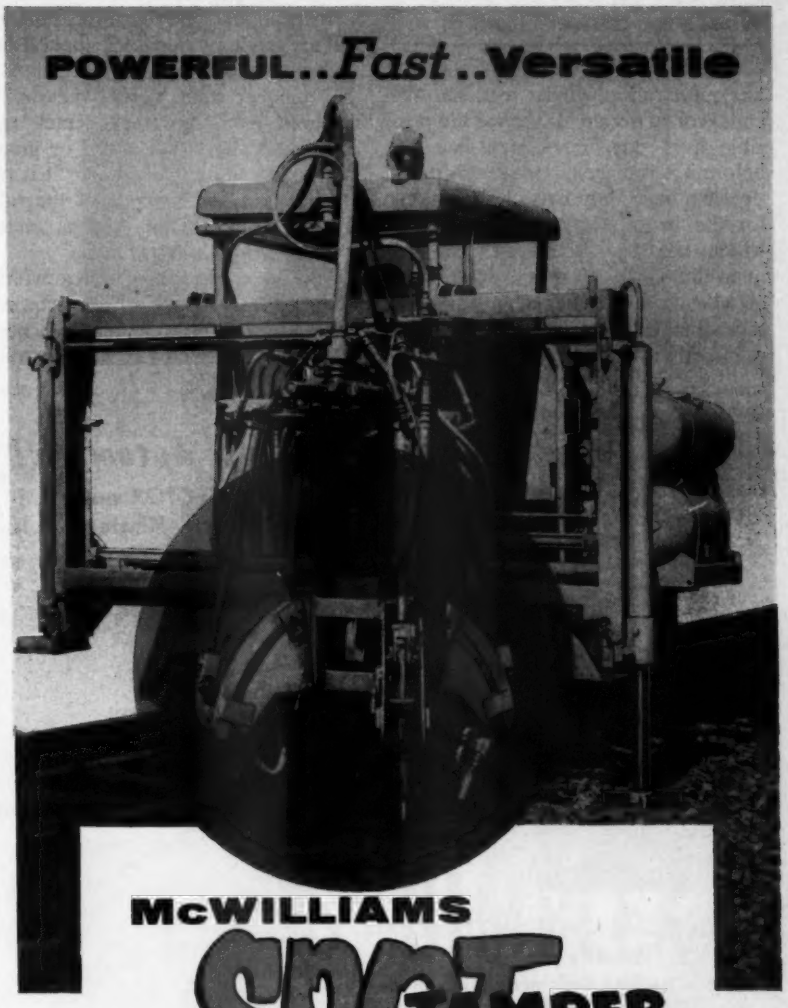
Special conditions on B&LE

By D. T. Faries
Chief Engineer
Bessemer & Lake Erie
Greenville, Pa.

Different railroads have different problems and different factors to consider when reclassifying rail which has been removed from main-line tracks. Generally speaking, most roads downgrade their rail step by step from main line relay rail to secondary or branch line relay rail to heavy-duty yard or industrial tracks, and finally to light-duty yard tracks.

The conditions on this road are considerably different from a large trunk line since we have very little secondary or branch-line territory and our rail-removal problems are concentrated in main tracks. The problem is further complicated by the fact that we have considerable mileage of 155-lb and 152-lb rail, which sections have become obsolete.

Under the above conditions, it is our practice to replace sufficient mileage of the heavy obsolete sections with new 140-lb continuous welded rail to provide for replacement of main-



McWILLIAMS SPOT TAMPER

With hydraulic jacks and air tamping, it provides ballast compaction equivalent to the McWilliams Multiple Tie Tamper. Travel speeds up to 25 mph, and means for setting off quickly. *Write for Bulletin ST-200.*

SPOT SURFACING . . .
Will correct cross level and pick up low joints on both rails with traversing head.

YARD and TERMINAL MAINTENANCE . . .
Tamps 85% of turnouts and has provisions for spiking guns, nutting attachments and other air tools.

WITH TIE GANGS . . .
Completely tamps all new ties a gang can install in a day.

WITH RAIL GANGS . . .
Will tamp all loose ties, keeping up with the gang.

ONE MAN OPERATION

Railway Maintenance Corporation

PITTSBURGH 30, PA.

line curve rail in heavier sections. We endeavor to obtain all service life possible from our heavy main-line rail before it is replaced. Under this practice, we have only two classifications for the heavy section main-line rail which has been replaced, namely, main-line relay or scrap. The same classifications also apply for the lighter section main-line rail, except that this rail is classified as yard-relay or scrap.

Inspections and classification of rail are made by our track supervisors under the supervision and direction of the engineer track before the rail is removed from the track. Each rail is classified by either a red or green paint mark to denote whether it is relay or scrap. The weight of the rail, of course, governs its use as main-line relay or side-track relay.

This is a fairly simple system which is easy to perform and fills our requirements satisfactorily. Where it is necessary to consider other uses for rail, such as branch-line relay rail, and where rail is removed from main-line tracks and shipped to central locations for cropping and re-drilling, or welding, considerably finer inspection would be required.

In these cases, I would recommend the use of rail templates to determine head wear and curve wear, and it would be necessary to give more attention to such factors as surface and line kinks, head checks, shell, engine burns, corrugation, joint wear, etc. Under these conditions, definite specifications should be developed covering all grades of rail and a system of colored paint markings established to denote each grade. Finally, I would prefer to have rail classified by qualified field personnel rather than stores-department employees.

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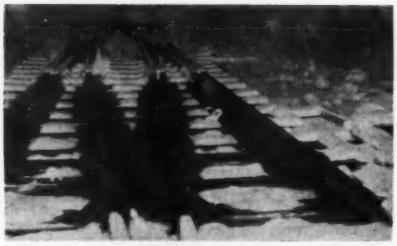

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Get full details on Rails Co. Snow Detector! Write, wire, phone for new Bulletin.

The RAILS Company

187 Maplewood Ave., Maplewood, N. J.
Offices: St. Louis, Mo., Chicago, Ill.

Has five classifications

By C. R. ALBERTS
General Roadmaster
Denver & Rio Grande Western
Grand Junction, Colo.

On the D&RGW we classify released rail under five general headings as follows:

(1) Full-ball rail suitable for replacement in main line.

(2) Curve worn from high side of curve suitable to be transposed to low side of curve.

(3) Full-ball rail from low side of curve suitable for use on high side of curve.

(4) Rail not suitable for main line use but good enough for sidings, yard tracks or industry tracks.

(5) Strictly scrap which includes badly worn rail, shorts and defective rail with fillet cracks, broken bases, head separations, etc.

Gives determining factors

By L. G. LAWSON
Roadmaster
Canadian National
Melville, Sask.

Classifications usually used on our road for rail pick-up are as follows: One-spot rails are again used in main or secondary main lines or branch lines; two-spot rails are usually used for sidings; and S rails are sent to the rail plants for cropping, checking and again re-classified as their condition warrants.

One-spot rails are usually shipped from the pick-up location directly to where they are to be again used. Each side of the track is loaded in separate cars and clearly marked on the billing

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When a BURRO goes to work — in the yard or on the line — it delivers fast, low cost performance. Equipped with bucket, magnet, hook, tongs or dragline bucket, a BURRO is ready and able to do the hundreds of odd jobs railroad work calls for. Fast travel speeds (up to 22 mph.) and heavy draw bar pull enable the BURRO to move itself and a work train or cars to the job in a hurry. Once on the job, a BURRO wastes no time getting the work done. BURRO's work power pays dividends every day it operates.

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THE WORLD'S MOST COMPLETE LINE

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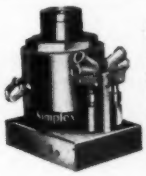
Hydraulic Jacks & Pullers



STANDARD HYDRAULIC JACKS
11 Models
1½ to 100 tons capacity
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6 Models
30 to 100 tons capacity
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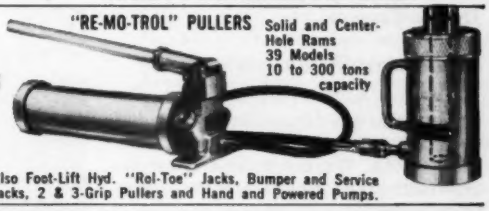

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Solid and Center-Hole Rams
39 Models
10 to 300 tons capacity

Also Foot-Lift Hyd. "Rol-Toe" Jacks, Bumper and Service Jacks, 2 & 3-Grip Pullers and Hand and Powered Pumps.

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Lever Jacks

Also Pole-Pulling, Reel, Timber, Cable & Wire Tensioning, Pipe Pushing & Pulling, Tie Remover, Tie Replacer, and Siding & Flooring Jacks.

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11 Models, 5 to 20 tons capacity.
Full capacity on toe or cap.

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3 Models, 25 to 35 tons capacity.
Side toe lift.

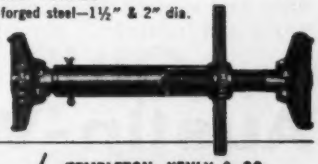
TRACK (TRIP) JACKS
13 Models (Five aluminum alloy)
Single and double acting.

146
Screw Jacks

SCREW JACKS 4-WAY HEAD — 19 MODELS
10 to 24 tons capacity.
Ball bearing, Malleable Housing, Safety peep hole.

JOURNAL JACKS 8 MODELS
15 to 50 tons capacity.
Powerful, light, low height.

TRENCH & TIMBER BRACES
22 Models. Drop-forged steel—1½" & 2" dia. screws. Adapt to any width of trench.



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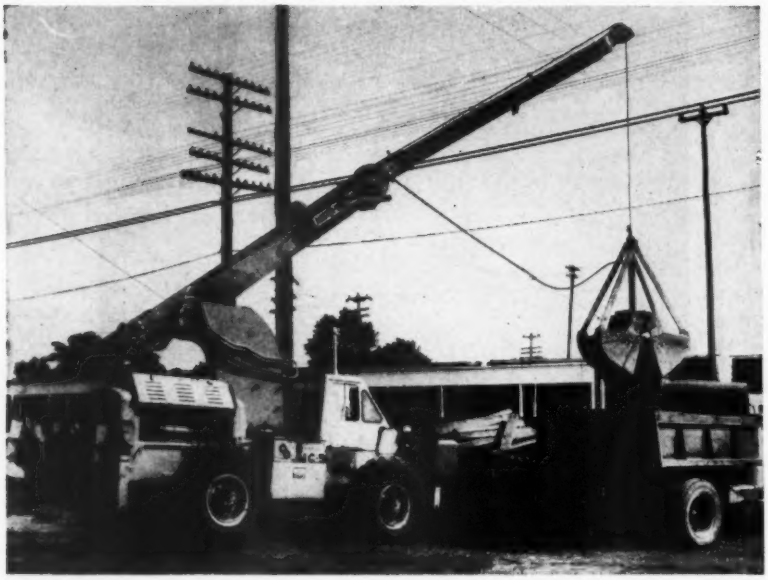

Model 210 A-W Hydraulic Crane, equipped with clamshell attachment on 10-ft. boom extension, performs yard maintenance work at the C&O's Plymouth Yard in Michigan.

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"The Austin-Western Hydraulic Crane is a good all-around piece of equipment for railroad terminal maintenance work," comments Harry Haines, supervisor of track of the Chesapeake & Ohio's Detroit Terminal.

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Mr. Haines adds, "This piece of equipment is very versatile and has no trouble navigating over rough terrain or railroad tracks. We use it as a crane to unload ties and handle rail and other track material, and at times attach a ¾-cu.-yd. bucket for redistribution of ballast, cleaning ditches, etc."

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Learn more about versatile A-W hydraulic cranes. Telescoping booms swing 360°. Self-propelled, rubber mounted—gasoline or diesel powered. 5 models—110, 210, 210-P, 220 and 410. All-wheel drive and steering assure plenty of power and traction . . . outstanding maneuverability. Also available for truck or stationary mounting.

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What's the answer? (cont'd)

from which side they were loaded so that, when again used in track, all rails are in the same side of the track as they were released from. In other words rail released from the north side of the track is again used in the north side. Curve-worn rail, if not too badly worn, is used on tangent track, while rail formerly used in tangent track is used in curves.

Two-spot rails are sometimes shipped directly to the point where they are to be re-used but these quite often go to the rail plant. S rails, which are all rails not classed as main line or siding rails, are all shipped direct to the rail plant. At the plant the rails are cropped if necessary and then reclassified.

All rail ends are usually built up and hardened not more than two years before a relay, and in this way one-spot rails are in pretty fair condition when re-used.

Rail is usually classified in the field by experienced rail inspectors. The determining factors in classification of the rails are wear at ends of rail where angle bars and rail meet, ball wear, curve wear, engine burns, and bent rails.

Two general classes

By T. J. VANSANDT
General Track Supervisor
Southern Pacific
San Francisco, Calif.

Rail is divided into two general classes: Relaying rail, and that which is unsuitable for further use as rail on our railroad. The factor determining these classifications is naturally the condition of the rail released. That which is free from blemishes, such as shelly spots, burns, etc., and excessive wear falls under the classification of secondhand relaying rail. In most cases it is classified in the field and shipped to the location where it will be used without moving through the stores department, thereby eliminating multiple handling.

The rail which is unsuitable for our use is, in most cases, shipped to the stores department for classification into three grades as follows:

(1) Industry rail—Suitable for use in industrial spur tracks.

(2) Rerolling rail—Selected scrap rail suitable for sale to steel rerolling mills.

(3) Scrap rail—remainder.

Use of new spikes

For an out-of-face tie-renewal and ballasting job, should new spikes be used on all new ties? Why? When gaging track in connection with this work, what percentage, if any, of new spikes should be used on remaining ties? Explain. Does practice vary between single and double track? Why?

Depends upon conditions

By J. W. NEIKIRK
Manager Roadway Maintenance
Norfolk & Western
Roanoke, Va.

The percentage of new spikes used in connection with an out-of-face tie renewal and ballasting job would depend on various conditions that usually exist, such as tonnage, curvature, remaining life of the rail and corrosive action, particularly in coastal areas, road crossings, tunnels, station grounds, coal fields, and heavy industrial areas.

Generally speaking, if such conditions are severe the average service life of a spike is relatively short, or approximately 15 years. Therefore, new spikes should be used in all new ties applied for line spikes, and good reclaimed spikes used for anchor or holddown spikes. In heavy tonnage tracks where the above conditions do not exist, 50 per cent new and 50 per cent good reclaimed spikes should be used in all new ties to maintain satisfactory spike conditions for holding the gage throughout the life of the ties.

For secondary lines and yard tracks, good reclaimed spikes should be used in all new ties except where the curvature is extremely heavy.

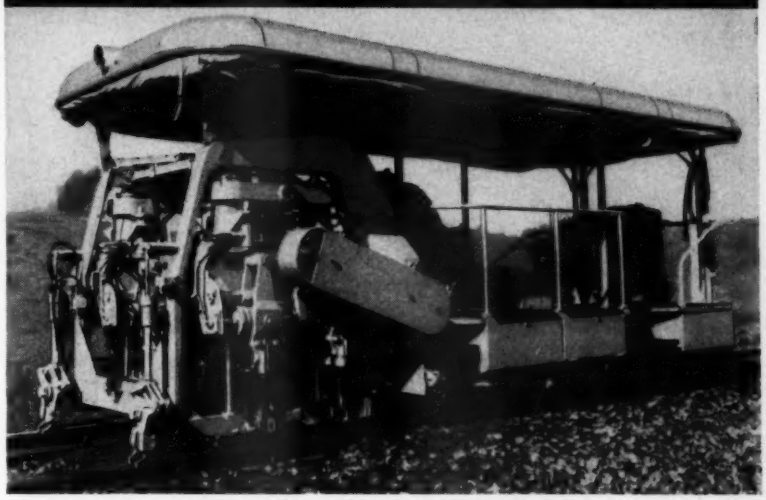
The percentage of new spikes used when gaging track in connection with this work again would depend on conditions mentioned above and the remaining service life of the ties. Where tonnage and curvature are heavy, new spikes should be used in all ties with 15 years or more remaining service life. Good reclaimed spikes should be used in ties with less than 15 years service life. On secondary lines and in yard tracks, reclaimed spikes should be used exclusively for regaging track.

The practice would not vary between single and double track where the tonnage is practically the same.

(Please turn the page)

Aeroquip Replacement Hose Lines Eliminate Piping Failures

PLASSER TAMPER REPIPED TO STOP VIBRATION DAMAGE



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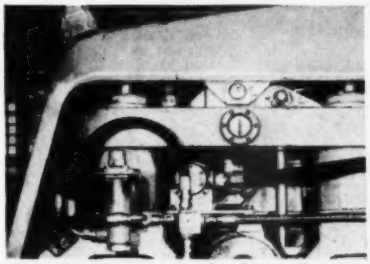
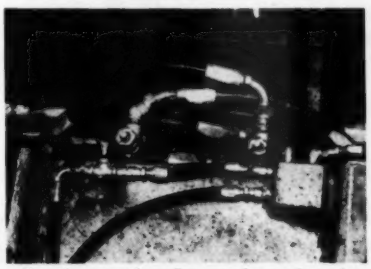


Aeroquip adapters were fitted into all metric thread connectors on the Plasser Tamper, for easy installation of Aeroquip Hose Lines.



All replacement hose lines can be made up by hand from Aeroquip Bulk Hose and Fittings.

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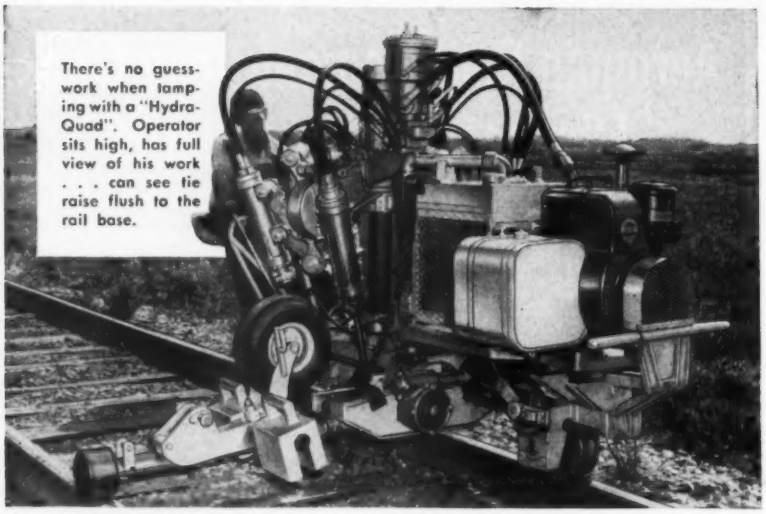

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You can spot tamp more roadbed per day, build smoother track . . . slash costs and equipment investment with a Racine "Hydra-Quad". This *job-proven* one-rail tamper combines *vibrating* action with *impact* force to compact ballast faster, more uniformly solid than usual single-action tampers. It delivers 1160 high-velocity impact blows per minute on each of four vibrating tamping tools . . . tamps an honest rate of 120 ties per hour.

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"Hydra-Quad" tamps uniformly under base of rail and to 18" on either side . . . in a pattern you can vary to suit your needs. It's easy to adjust for different rail heights and crooked or wider-than-average ties. Tamps over guardrail and close to switch frogs.

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Built-in jack lifts entire unit for turn-around or quick-set-off on rubber-tired wheels. "Hydra-Quad" is self-propelled . . . powered by 18 hp gas engine . . . starts-stops fast and travels at speeds to 12 mph. Clip and mail the coupon for location where you can see "Hydra-Quad" tamper at work . . . or check for literature on any machine in the Racine line including new "Oct-A-Gun" 2-rail tamper, and "Anchor Fast" the machine that applies anchors mechanically.

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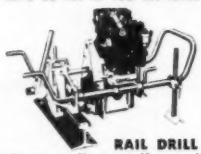

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What's the answer? (cont'd)

In many instances, however, in double-track territory loads predominately move in one direction and empties return over opposite track. In such cases the track carrying the greatest tonnage should be given preference in regard to the percentage of new spikes required.

Depends on spike condition

By L. G. Lawson
Roadmaster
Canadian National
Melville, Sask.

For an out-of-face and tie-renewal job the number of new spikes required depends entirely on the condition of the old spikes removed from the track.

On our railroad, especially on our main lines, the rail is renewed about every ten years and at this time 80 per cent new spikes are used. Where this condition exists very few new spikes are required for tie-renewal jobs when renewing ties in out-of-face tie-renewal and ballasting operations. When spikes are removed with power spike pullers they are usually as straight as new spikes. This also applies where spikes are driven with power spike drivers. When hand-driving and hand-pulling with claw bars prevails more new spikes are used.

On lines where steel is seldom removed I certainly agree that most new spikes should be used in out-of-face tie renewal and ballast jobs, as these spikes may remain in the tie for their entire life and certainly where this condition exists all good spikes should be used. On this type of track the spikes that are removed are usually smaller than the ones now universally used, and are usually rusted so badly that it is just a waste of time trying to drive them with power drivers.

When gaging is being done in conjunction with tie renewals the same pattern for new spikes should be used as the one used for tie renewals with the exception that if it is the policy to use upwards of 80 per cent new spikes when ties are renewed, old spikes can be used more freely in gaging track as new spikes will be used when the old ties are renewed.

Personally I cannot see where single or double track should make any difference in the amount of new spikes required.

Cost is factor

O. C. PREWITT
District Roadmaster
Texas & Pacific
Marshall, Tex.

In an out-of-face tie-renewal and ballasting job, new spikes should in most cases, be used in all new ties. The phrase "most cases" is used because this, as with most other problems, will vary under different circumstances. I have known of conditions where new rail was laid and, since most of the spikes were badly worn, new spikes were used in the relay. (Old spikes were culled out and used in yards, etc.) Since the spikes showed little or no wear at the time of the next tie-renewal cycle, there was no need to use new spikes in the new ties.

This, as all other problems, must be worked out to get the most efficiency with the least expense. If a spike is in such condition that it will last the life of a tie, it would be poor stewardship to spend what it would cost to get the new spike and then another cost moving the secondhand spike to where it could be used. Supervision should be of such quality to insure that the spike that is used will last the life of the tie.

Another thing to take into consideration is the possibility of using all secondhand spikes in the territory where released. Out-of-face programs, for instance, always require some gaging. Usually, all secondhand spikes which are released from tie renewals can be used in the gaging. In such cases it is advisable to use all new spikes in the new ties.

Trying to set the percentage of new spikes that should be added in the gaging operation would be as impossible as to set the percentage of ties that are to be renewed. The condition of the spikes will have to be judged in the field in the same manner as the tie conditions.

Some roads have used secondhand spikes as holddowns. Where holddowns are necessary, this is a very good way of getting a little more out of a spike that might otherwise have been scrapped. In cases where this is done, all new ties should have new rail spikes for the old spikes can be salvaged with little expense.

The cost of a spike can quickly be equalled by transportation costs. This is one of the jobs of the supervisor: To see that the new and secondhand

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spikes can be used with minimum handling. On double-track territory, the percentage of secondhand spikes used can be increased or decreased because there is twice the opportunity for short handling. There is also the danger of over or under-estimating.

This question can be summed up this way: It is squarely up to supervision to see that the spike is used in the place where it will serve its purpose with least expense. The cost of the spike is definite, but the cost of using it is very flexible.

Assures long service life

By Lee Spencer
Track Supervisor (Ret.)
Long Island Railroad
Scottsdale, Ariz.

As a roadmaster I always made every effort to use all new spikes on all new ties inserted in an out-of-face ballast job, because this was the only way to get long service life from both ties and spikes in heavy-duty track requiring detail gage. Using fit or reclaimed spikes is false economy in such trackage, the component parts of the track structure loosening up very rapidly as a rule.

In re-gaging such track where anchor or plate-holding spikes were standard, I always reversed the usual practice and used new spikes in the anchor holes and if the use of fit or reclaimed spikes was necessary because of material shortages, I used these spikes as line or rail-holding spikes. Almost invariably the use of fit or reclaimed spikes as anchor or plate-holding spikes resulted in loose and shifting tie plates, followed up soon by loss of detail gage which is most essential in heavy-duty high-speed track. I also followed this practice of using new spikes as anchor or plate-holding spikes on *new* rail installations for the same reasons.

Under equal tonnage I can see no difference between single and double track, unless in reference to double-track railroads being converted through CTC to single-track operation by retiring one of the tracks. In such cases, I think the increased tonnage on the single track would justify these same practices as I've outlined above.

In my judgment all railroads would have far better track if they insisted on a simple change in tie-plate punching, making all holes $^{11}/_{16}$ in for anchor holes. Those roads which have adopted the $^{11}/_{16}$-in size for both line holes and anchor holes find this simple change greatly reduces the necessity of regaging sharp curves where ¾-in line-hole punching was formerly used. A small detail like this is the difference between good and economical track to maintain and/or poor track and costly maintenance.

Old spikes damage new ties

By W. A. Schubert
Division Engineer (Ret.)
St. Louis-San Francisco
Chaffee, Mo.

For reasons of stability and economy new spikes should be used on all new ties on an out-of-face tie-renewal and ballasting job. The ties being renewed usually have 15 or more years of service life behind them, which resulted in the spikes becoming corroded. If re-used in a new tie, these spikes would damage the wood fiber of the new tie, due to their roughness, while new spikes enter the tie with a clean, cutting action which does minimum damage to the spike holes, and gives a firmer holding action to the track structure.

New spikes are driven faster and better by hand or machine tools than the old spikes removed. Many times the old spike will bend when being driven into the tie.

During the service life of a tie, the spike is subjected to mechanical wear, causing it to become throat-cut. The result is that the head of the spike will break off when being redriven and, if not, will not have full contact with the base of the rail. Considerable time would be consumed in picking out good, secondhand spikes for redriving in new ties, which would make this operation costly. Again, 15 or more years ago the use of $^{9}/_{16}$-in by 5½-in spikes was common, while today we are using the ⅝-in by 6-in spike, together with a larger tie plate. The use of a re-used smaller spike in a larger plate would leave too much play, resulting in reduced holding power.

Use of old spikes unsafe

By Thor Monrod
Section Foreman (Ret.)
Northern Pacific
Billings, Mont.

I would use new spikes in all new ties except where new rail relays are contemplated in the very near future, or such work was done previous to the tie-renewal and ballasting job. The reason for the exception is that the general practice, when rail relays are made, is to use new spikes. Therefore the spikes will be either prac-

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tically new or new spikes will be installed anyway in the very near future depending on when the rail relay work is done.

The use of old secondhand track spikes in new ties is not a safe or sound or economical practice. Spikes several years old or older are generally throat-cut and worn. Some may even be crystallized or distorted in shape or size, and would not be good to redrive with present-day machines. With such spikes it would not be possible to obtain good line and gage, nor would they have the full life expectancy of the ties renewed.

When gaging track I would prefer to use new spikes as much as possible. You will invariably find the old spikes have become bent due to the out-of-gage condition. If these old spikes are re-used they cannot be applied properly and consequently would not hold the gage. The straightening of these spikes in the field is not only costly but unsafe. I do not think there would be very many of the old spikes that would be usable, possibly 10 or 15 per cent. These spikes could be saved and re-used on less important tracks.

Practice varies between single and double track. On single track the motion and wear on track materials are in both directions, resulting in a sawing motion. For this reason the track materials last at least twice as long in double-track territory.

Biographical briefs

(Continued from page 10)

entered the service of the C&O in 1925 as a draftsman there. Mr. Poore was promoted to chief draftsman in 1930 and assistant division engineer at Richmond in 1939. From November 1943 to April 1946 he was in the U. S. Army, serving in Europe with the Transportation Corps. Mr. Poore was appointed assistant general superintendent bridges and buildings at Richmond in 1946. He was named assistant engineer there the following year, which position he held until his recent promotion.

Preston P. Poulton, 53, who was recently promoted to roadmaster on the Rock Island at Sayre, Okla. *(RT&S,* July, p. 10), was born at Medora, Kan. He entered the service of the Rock Island in 1925, joining the Santa Fe in 1933. He returned to the Rock Island in 1939 as a laborer, subsequently being promoted to extra gang foreman, relief foreman and section foreman. During World War II he served in Africa and Italy with the 715th Railway Battalion. Mr. Poulton was serving as track supervisor at Tucumcari, N. M., at the time of his recent promotion.

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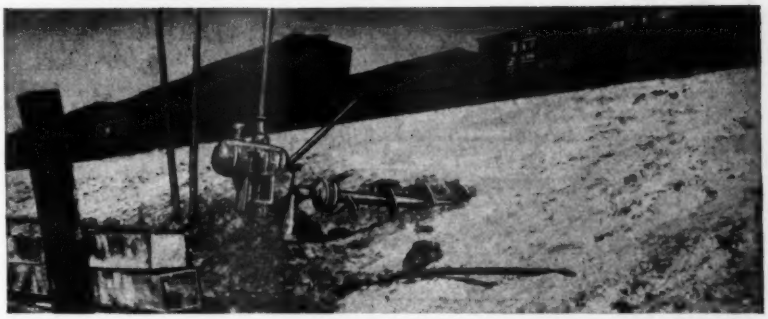

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Supply trade news

BUCYRUS-ERIE COMPANY—The territory of the **Zeco Company,** Minneapolis, Minn., distributors of Bucyrus-Erie crane-excavators, has been changed to include 21 counties in west central Wisconsin and to exclude 10 counties in northeastern Minnesota.

L. B. FOSTER COMPANY—Andrew M. Filak, manager of the Cleveland (Ohio) district office, has been promoted to the newly created position of manager of product research and development, with headquarters at Pittsburgh, Pa. **Philip G. Hughes** has been appointed to the newly created position of manager, construction products sales, with headquarters also at Pittsburgh.

LE TOURNEAU-WESTINGHOUSE COMPANY —Lloyd A. Rager, product manager of the Motor Grader Division, has been appointed manager of the newly established Products Marketing Department of this company, according to an announcement by **L. A. DePolis,** vice president, marketing. In his new capacity Mr. Rager will be responsible for the initiation and development of marketing and sales plans, establishing procedures and development of market data based on product research. He will be responsible for the coordination of all company sales and marketing functions and facilities, including sales promotion and training. He has been associated with the firm since 1936.

MORRISON-INTERNATIONAL CORP.—R. B. Hornberger has been appointed representative of the company's International Car division for the states of Alaska, Arizona, California, Idaho, Nevada, New Mexico, Oregon, Utah and Washington, according to an announcement by **B. J. Yolin,** vice president and general manager. Mr. Hornberger will have offices at 525 Market Street, San Francisco, Calif.

PORTLAND CEMENT ASSOCIATION — H. A. Sawyer, chairman of the board and president of the Lone Star Cement Company, New York, has been elected chairman of the board of directors of the Portland Cement Association, succeeding **Cris Dobbins,** president of the Ideal Cement Company, Denver, Colo.

Mr. Sawyer graduated from the Agricultural and Mechanical College of Texas in 1916 with a Bachelor of Science degree in civil engineering. His engineering career includes service with the Gulf, Colorado & Santa Fe at Galveston, Tex., and with the PCA as a field engineer in Texas.

Obituary

W. F. Kasper, retired chairman of the board and president of Fairmont Railway Motors, Inc., died on October 30.

Association news

Mississippi Valley Maintenance of Way Club

The next meeting of the club will be held on December 14 at the usual location, the Ambassador-Kingsway Hotel, 108 North Kingshighway, St. Louis, Mo. The program, entitled "Big Game Trails Through Africa," will be presented by Denver Wright. The social hour will commence at 5:30 pm with dinner starting at 6:30.

Northwest Maintenance of Way Club

The December meeting of the club will be held on the 15th at the usual location, Coleman's Cafe, 2239 Ford Parkway, St. Paul. The social hour will commence at 5:30 pm with dinner starting at 6:30.

The program will be presented by the Link Belt Company and will feature a motion picture showing the 5½-mile belt conveyor system of the Ideal Cement Company. Designed, fabricated and erected by Link Belt, the system is claimed to be the longest permanent cross-country belt conveyor in the world. A question and answer period will follow showing of the film.

AREA meeting, NRAA exhibit to be held as scheduled

The 1961 annual meeting of the American Railway Engineering Association and the 1961 exhibit of the National Railway Appliances Association will be held next March as originally scheduled. AAR approval for the AREA meeting came early in November after some doubt was cast by a letter from AAR president, Daniel P. Loomis. Dated October 7, the letter asked executive vice chairmen and secretaries of divisions and sections to consider cancellation of 1961 meetings "unless there is a significant and overriding reason" for holding them.

The AREA meeting will be held on March 7-9 at Chicago, with headquarters at the Conrad Hilton Hotel. However, all business sessions, most or all committee meetings and the annual luncheon will be held, as planned, at McCormick Place, Chicago's new lakefront exposition center, which will also be the location of the NRAA exhibit. Doors at the exhibit will open on March 6.

At a meeting of the AREA's Board of Direction, held on October 24 at the AAR Research Center, Chicago, the personnel and assignments of all technical committees for 1961-62 were approved. Other action taken at this meeting included re-establishment of Committee 18—Electricity, which had been dissolved in 1945. That committee will assume the assignments dealing with fixed-property matters formerly handled by the Electrical Section, Engineering and Mechanical Division, AAR, which will be discontinued at the end of the current year. P. B. Burley, superintendent of communication and electrical engineer, Illinois Central, was appointed chairman of the committee.

Neal D. Howard, the AREA's executive secretary, announced that as of the 25th of November, 29 students on college campuses had enrolled with the association as "student affiliates." The plan to enroll student affiliates was inaugurated last August for the purpose of establishing closer relations between students and the association. Students enrolled as affiliates will receive the association's six technical bulletins and, through the association, the 12 regular issues of *Railway Track and Structures.*

Helps from Manufacturers

The following compilation of literature—including pamphlets and data sheets—is offered free to railroad men by manufacturers to the railroad industry. To receive the desired information, write direct to the manufacturer.

•

RAIL DRILL. The NCG-Obear one-man operated multiple rail drill is described and illustrated in a new bulletin. Designated N-165, the bulletin points out the advantages of the machine, including cost savings, drilling flexibility, ease of operation, long drill life and easy alignment of bits. Features of the unit are listed and specifications and details of construction are given. (Write: *National Cylinder Gas Division, Chemetron Corporation, 840 North Michigan Ave., Chicago 11.*)

CRANE CARRIER. A two-color bulletin is available which describes and illustrates the new Schield Bantam Model 406 heavy-duty crane carrier. Designated A-303, the bulletin points out the features of the machine and gives complete specifications. Standard equipment is listed, including 220-hp, V-8 gas engine, air brakes on all wheels, and power steering. (Write: *Schield Bantam Company, Dept. RTS, Waverly, Iowa.*)

INDUSTRIAL HOSE. A 12-page booklet is available which indicates the suitability of the various styles of Aeroquip hose for carrying 112 different liquids and gases. Designated 627, the booklet was prepared as a handy, simplified guide for the use of maintenance supervisors and designers. It is arranged alphabetically, from acetate solvents to zinc salt solutions, and indicates suitability of the hoses as being excellent, good, conditional or unsatisfactory. The booklet also includes information regarding pressure, size and temperature ranges of the individual types of hoses available. (Write: *Aeroquip Corporation, Dept. RTS, Jackson, Mich.*)

EARTH BORER. The Ka-Mo E300 electric-powered boring unit is described and illustrated in a new six-page bulletin. The boring range of the unit is described, including its ability to bore 48-in diameter holes 40 ft deep and 12-in holes 240 ft deep in either a vertical, horizontal or angular direction. Features of the E300 are pointed out, such as 440-volt, 3-phase, 60-cycle squirrel cage motor; protective slip clutch; power or gravity auger feed and control panel with remote single lever control. One section of the bulletin is devoted to on-the-job photographs. (Write: *Kwik-Mix Company, a Division of Koehring Company, Dept. RTS, Port Washington, Wis.*)

MOTOR GRADER. A four-page bulletin is available which describes and illustrates the new L-W Model 330-H motor grader. Designated Form MG-174, the bulletin points out the features of the new 100-hp machine, including constant-mesh transmission, rubber-mounted engine and hydraulic brakes. Specifications are included. The bulletin also describes and illustrates a number of units of optional equipment available for use with the Model 330-H. (Write: *LeTourneau-Westinghouse Company, Dept. RTS, Peoria, Ill.*)

RAIL LOADER. A one-page circular is available which describes and illustrates the new Nolan hydraulic rail loader. The features of the unit are pointed out and specifications are given. A picture sequence shows how the loader operates from the deck of a push car to load rails onto the push car. (Write: *The Nolan Company, Dept. RTS, Bowerston, Ohio.*)

PILE HAMMERS. The McKiernan-Terry line of steam or air-operated single-acting pile hammers is described and illustrated in a new bulletin. Designated 691, the bulletin describes the operation of the hammers and how they can be used for underwater pile driving. The bulletin points out the features of the units and includes specifications, ordering instructions and a graph showing bearing values based on the Engineering News formula. Anvils and special base attachments available for use with the hammers are described and illustrated. (Write: *McKiernan-Terry Corporation, Dept. RTS, Dover, N. J.*)

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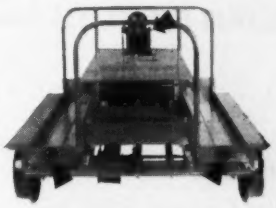

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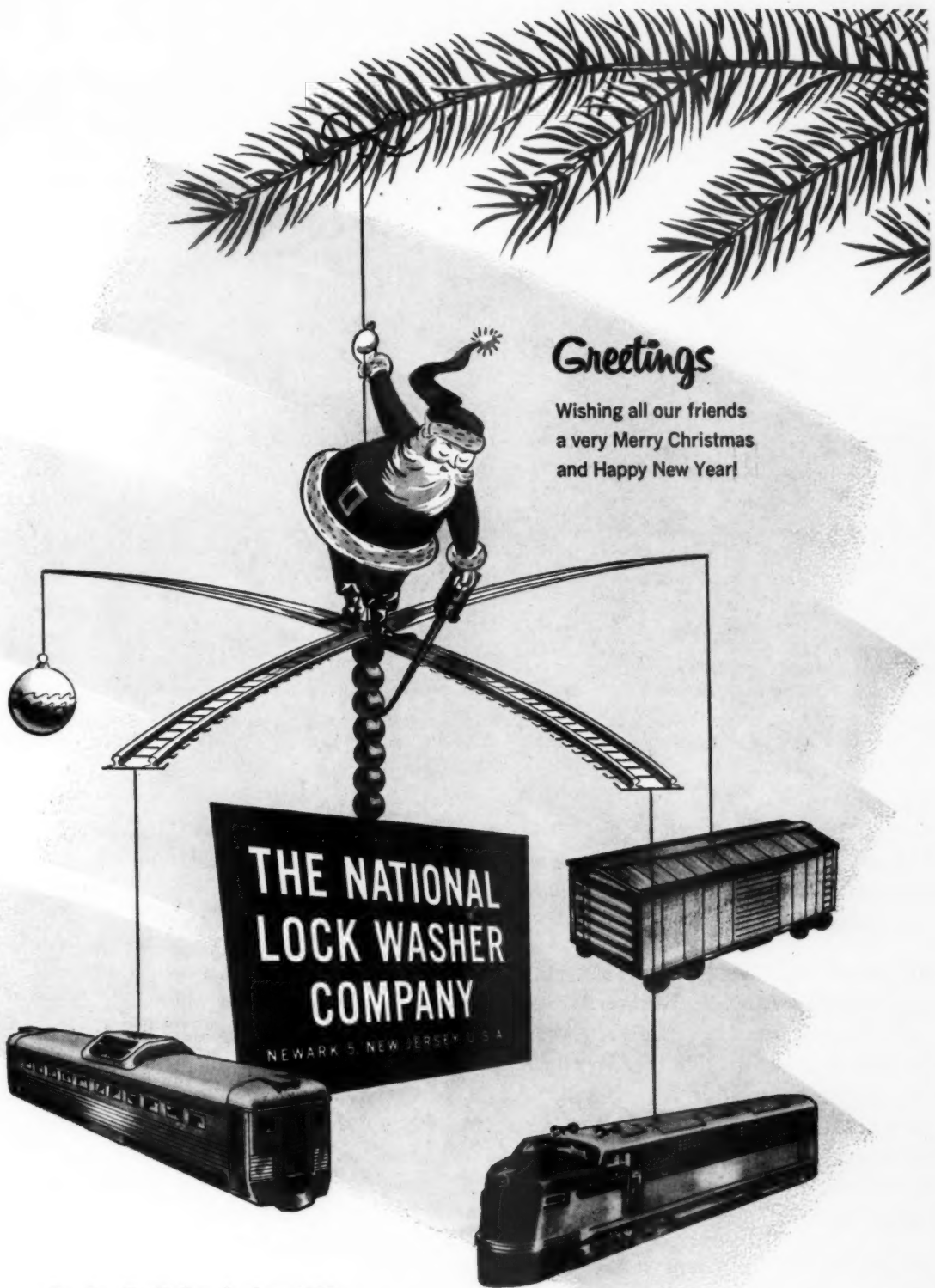

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